A PICTORIAL SURVEY OF CURRENT PRACTICE, EQUIPMENT AND MATERIALS

Construction Methods

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DECEMBER
1941

McGRAW-HILL
PUBLISHING
COMPANY, INC.
PRICE 50 CENTS

Cantilever Steel Bents
for Elevated Highway

Insulated, Shatterproof
Walls Inclose Huge
Windowless Aircraft
Plants

Prefabricating Shop
Speeds Defense Housing
By STANLEY A. BROWN,
Project Manager, Barrett & Hilp

Precast Concrete Joists
Cut Cost of Navy Ware-
house

Details of Bit Technique
in Diamond Drilling

GOWANUS ELEVATED HIGHWAY steel is erected by cantilever roadway on [illegible] basis.

Laying a section of natural gas pipe line from Texas to Chicago. Inland steel was used for the pipe and also went into the construction of tractors and other machines employed in this work.

Inland Steel for Pipe Lines —the Arteries of Defense

Just as fuel may be termed the life blood of production, so pipe lines—with their vital cargoes of oil and natural gas—are the arteries of National Defense.

More than 320,000 miles of these lines are already in service, but substantial additional capacity must be provided to meet the expanding needs of our defense industries, to replace the intercoastal tankers transferred to overseas service.

That is why—week after week—Inland is shipping large tonnages of steel plates to be formed and welded into pipe—then delivered to the field crews who are putting down thousands of miles of new lines. This is but one of the many ways Inland is aiding the great program in which our country is engaged, for all Inland men and all Inland facilities are geared to our No. 1 Job—National Defense.

Inspecting pipe, made of Inland steel, at th[redacted] plant of A. O. Smith Corporation, Milwauk[redacted]

INLAND STEEL

TECHNOLOGY DEP[redacted]

INLAND STEEL CO.

38 S. Dearborn Street, Chicago • Sales Offices: Mil[redacted]s, Kansas City, Cincinnati, New York

CURRENT JOBS

.... and Who's Doing Them

BUILDINGS

Public—War Department awarded contract for $65,000,000 powder plant to be built in Merrimack, Wis., for Hercules Powder Co., to **Bechtel-McCone-Parsons Corp.**, of Los Angeles, Calif. **W. R. Grimshaw Co.**, of Tulsa, Okla., was awarded contract to construct Ordnance Works in Choteau, Okla., by War Department, at estimated cost of $37,000,000. In Painesville, Ohio, the **Austin Co.**, of Cleveland, will erect plant for manufacture of magnesium for approximately $16,000,000, to be financed by Defense Plant Corp. **Aluminum Co. of America** will build an aluminum reduction plant in Troutdale, Ore., for War Department, at cost of $10,000,000; Defense Plant Corp. will finance. Contract for additional facilities for Naval Air Station, Naval Supply Depot and Naval Operating Base at Norfolk, Va., went to **Virginia Engineering Co.**, of Newport News, at estimated cost of $3,627,000.

In Canal Zone, contract for additional facilities for Navy Operating Base went to **Lindgren & Swinerton, Inc.**, of San Francisco, Calif., **Hegeman Harris Co., Inc.**, and **Tucker McClure**, of New York, for $2,668,320. In Independence, Mo., supplemental contract for two brick buildings in connection with Lake City Ordnance Plant, for War Department, went to **Walbridge-Aldinger Co.** and **Foley Bros., Inc.**, of Independence, to cost approximately $2,000,000.

Industrial—In Mount Hope, N. J., **J. G. White Engineering Corp.**, of New York, will construct hoist house for $2,000,000. **James Stewart & Co.**, of New York, was awarded airplane plant contract, including concrete storage building, garage, ramps, etc., to be erected in Grand Prairie, Tex., at approximate cost of $1,250,000. **Austin Co.**, of Cleveland, Ohio, submitted bid for construction of airplane plant for Bell Aircraft Corp., in Buffalo, N. Y., at estimated cost of $4,300,000. Successful bidder for warehouse contract in Baltimore, Md., was **Turner Construction Co.**, of New York, with bid of $700,000. In Pittsfield, Mass., **The Lummus Co.**, of New York, will build brick and steel phenol plant for $1,000,000. Power plant is under construction in Westerly, R. I., by **United Engineers & Constructors, Inc.**, of Philadelphia, Pa., for approximately $2,500,000. **Stone & Webster Engineering Corp.**, of New York, received contract to build power plant addition in Rockford, Ill., for Central Illinois Electric & Gas Co., at price of $1,350,000.

HEAVY CONSTRUCTION

Successful bidders for Granby Dam contract, in Colorado, were **Peter Kiewit Sons Co., George W. Condon Co., W. E. Callahan Construction Co.**, and **Gunther & Shirley Co.**, of Los Angeles, Calif., with bid of $5,133,837. At Mare Island, Calif., additional shipbuilding facilities are under way at Navy Yard by **The Kaiser Co.**, local contractor, for $5,624,000. **Pittsburgh-Des Moines Steel Co.**, of San Francisco, Calif., received contract for fabricated steel wind tunnel to be erected at Moffett Field, Calif., at price of $5,202,320. Drydocks in Hoboken, N. J., are under construction, for Navy Department, by **Foundation Co.**, of New York, at cost of $3,500,000, to be financed by Defense Plant Corp. **Rayner Construction Co., Ltd.**, of Leaside, Ont., was low bidder for sewage disposal plant in Toronto, Ont., Canada, with bid of $5,600,000. Steel floating drydock at Navy Yard, Brooklyn, N. Y., will be constructed by **Harris Structural Steel Co.**, of New York, at estimated cost of $2,000,000; Defense Plant Corp. will finance. Successful bidder for contract for air corp training center, Santa Ana, Calif., was **Griffith Co.**, of Los Angeles, with low bid of $2,016,181.

HIGHWAYS

Among recent highway contract awards are the following: California: $324,547 to **Union Paving Co.**, of San Francisco; $260,074 to **J. E. Haddock, Ltd.**, of Pasadena. Colorado: $199,395 to **Switzer Construction Co.**, of Denver, Mississippi: $207,160 to **Hooper Construction Co.**, of Jacksonville, Fla. Pennsylvania: $839,676 to **C. W. Good, Inc.**, of Lancaster; $583,243 to **Fred Berlanti & Son, Inc.**, of Harrison, N. Y.; $302,384 to **County Construction Co.**, of Carnegie; $210,076 to **B. B. Construction Co.**, of Philipsburg. Texas: $219,084 to **J. E. and H. Barnhill**, of Turkey; $230,746 to **E. Lloyd**, of Fort Worth.

DECEMBER, 1941

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Construction Methods

A Pictorial Survey of Current Practice, Equipment and Materials

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N. A. Bowers (San Francisco) Nelle Fitzgerald

A McGRAW-HILL PUBLICATION

The HOW of it

For the benefit of readers concerned with the practical application of method or equipment the following references are to articles or illustrations in this issue that tell:

•

How **TOWER-MIXER UNIT** on truck mounting produced concrete for aircraft plant. —p. 39

How **CANTILEVER STEEL BENTS** on pipe pile foundations carried elevated highway. —p. 42

How **STEEL FALSEWORK TOWER** supported cantilever arm of 216-ft. bridge span across canal for elevated highway. —p. 43

How **TRAVELING STIFF-LEG DERRICK** on deck placed new steel floor members in old elevated railway structure. —p. 44

How **PIPE-PILE FOUNDATIONS** for grade separation structure were put down to depths of 50 to 140 ft. —p. 45

How **BITUMINOUS SURFACING** for highway was spread and finished by dual-purpose machine. —p. 47

How **CONSTRUCTION TRESTLE** for masonry dam 200 ft. high was carried by massive concrete columns embedded in structure. —p. 48

How **CONCRETE DELIVERY** for large dam was handled from construction trestle in 2-cu.yd. buckets. —p. 49

How **WINDOWLESS WALLS** of prefabricated steel panels for aircraft assembly plants were insulated with glass fiber. —p. 50

How **SHATTERPROOF WALLS**, 65 ft. high, for aircraft plant were inclosed with prefabricated, insulated, cellular steel panels. —p. 52

How **ROOF INSULATION** on steel-frame assembly building was effected with glass wool blankets. —p. 53

How **TIMBER CONSTRUCTION** using special connectors provided huge buildings for grain storage. —p. 54

How **PREFABRICATING SHOP** speeded erection of 500 houses in 49 days. —p. 58

How **SPECIAL FRAME TONGS**, hung from boom on truck, placed floor sections of houses. —p. 59

How **NIGHT LIGHTING** on airport construction was provided by truck-mounted power unit serving 4 floodlights. —p. 62

How **ROCK TUNNEL FACE** was marked for drilling by paint lines sprayed on by mobile rig. —p. 63

How **BITS FOR DIAMOND DRILLING** on dam projects were prepared and serviced to produce rock cores. —p. 64

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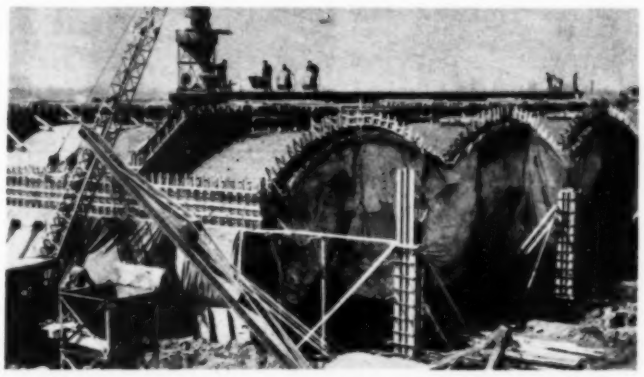
"Have it your own way Hendricks—but I never heard of a bridge designer using a model!"

"That typewriter is driving me nuts. I don't see why she can't use the noiseless kind!"

"That's what the sign says, ain't it?"

MILE OF CONCRETE ARMY DEPOTS BUILT IN RECORD TIME

TOP-SPEED DEFENSE CONSTRUCTION WITH 'INCOR'



Concrete Warehouses, Columbus, O., General Depot, U. S. Army. Constructing Quartermaster: Lt. Col. A. F. Dershimer. Contractor: Corbetta Construction Co., New York. Designers: Roberts and Schaefer Co., Chicago-Washington.

FOUR firesafe warehouses, each 182′ wide and 1562′ long, with reinforced concrete frames carrying thin barrel-arched roofs, were completed in record time at U. S. Army's General Depot, Columbus, O.

Three of the warehouses (see air view, above) were built first. Using 'Incor' 24-Hour Cement and 6 sets of 80′ x 180′ forms, Corbetta Construction Company's progress schedule was based on pouring one 80′ section each work day, using each form set 10 times. First roof concrete placed March 2 . . . low temperatures through March, 8° to 46° . . . adequate protection supplied. Last pour, June 10. Based on strength tests of beams and cylinders cured under job conditions, concrete was stripped in 24 to 48 hours. *Twenty acres of warehouse structure concreted in record time!*

Forms were re-used on a nearby fourth warehouse. 'Incor' concrete was stripped throughout in 24 hours . . . this ¼-mile-long structure completed in 36 calendar days. Typical 'Incor' performance.

38,300 bbl. of 'Incor' were used in frame and roof construction of the four warehouses . . . 47,800 bbl. of Lone Star Cement in footings and other concrete. Speed defense . . . use 'Incor'* where dependable high early strength cuts form and heat-protection costs . . . elsewhere, use Lone Star. Better cement makes better concrete. Write for copy of "Cold-Weather Concreting." Lone Star Cement Corporation, Room 2266, 342 Madison Avenue, New York.

*Reg. U. S. Pat. Off.

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"UNDER THE WIRE"

"We had to get the job done before the rains — so we put five Austin-Western "99M's" to work, and NOW WE ARE UNDER THE WIRE."

Charles L. Harney
(Contractor—San Francisco)

This $1,500,000 contract is a vital part of the Government Defense Housing Project at Vallejo, California. It covers the grading and paving of 7½ miles of streets and roads . . . requiring an estimated 178,000 cubic yards of excavation and dirt moving.

A motor grader without power on the front wheels is like a draft horse with roller skates on his front feet.

● The value of the "99M's" greater working weight . . . demonstrated so effectively at Vallejo . . . quickly makes itself felt on any job. In addition to handling all types of construction or maintenance jobs in record time, the "99M" assures substantial savings in power and operating costs . . . savings made possible by the live pulling power on front wheels, which eliminates the drag on engine power caused by 3 to 4 tons of front end dead weight.

Ask for a demonstration and see for yourself what the "99M's" greater working weight means in terms of capacity, power saving and extra range of usefulness. THE AUSTIN-WESTERN ROAD MACHINERY CO., Aurora, Ill.

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DUTCHER makes the dirt FLY!

HERE ARE just a few of the many other contractors using Euclids for airport grading: Frank Mashuda and Laub & Collins — Johnstown Airport, Pa. . . . C-G Construction Co. — Wright Field, Dayton, Ohio . . . R. W. Briggs & Co. — Mission Airport, Texas . . . Hardaway Contracting Co. — Moultrie Flying School, Georgia . . . J. L. Sigretto & Sons, Inc. — Morristown Airport, New Jersey . . . Merveldt & Lawson — Bethany Airport, Oklahoma.

18,000 Cu. Yds. PER DAY

Yes, sir! Bottom-Dump EUCLIDS are making the dirt fly for Dutcher Construction Corp. at the New Castle County Airport near Wilmington, Delaware — 18,000 cu. yds. every 20-hour working day.

The entire 2,500,000 cu. yds. on this job is being moved with eight 13-yard and six 10-yard Bottom-Dump EUCLIDS and three 48" elevating graders. These fourteen Euclids are hauling approximately 1500 loads a day, 1800 feet each way.

There are good reasons why Euclids are at work on most defense projects. Be sure to check Euclid dependability and low hauling costs for your next job. We'll be glad to supply the facts and figures.

The EUCLID ROAD MACHINERY Co.
CLEVELAND, OHIO

EUCLID SELF-POWERED EARTH • ROCK • COAL • ORE HAULING EQUIPMENT

Also — SPREADER WAGONS • ROTARY SCRAPERS • TAMPING ROLLERS

SMOOTH as concrete formed against PLYFORM

● Plyform is the only grade of Douglas Fir Plywood made especially for concrete form work.

● It's manufactured from specially selected veneers and special highly water-resistant glues in accordance with U. S. Commercial Standard CS45-40.

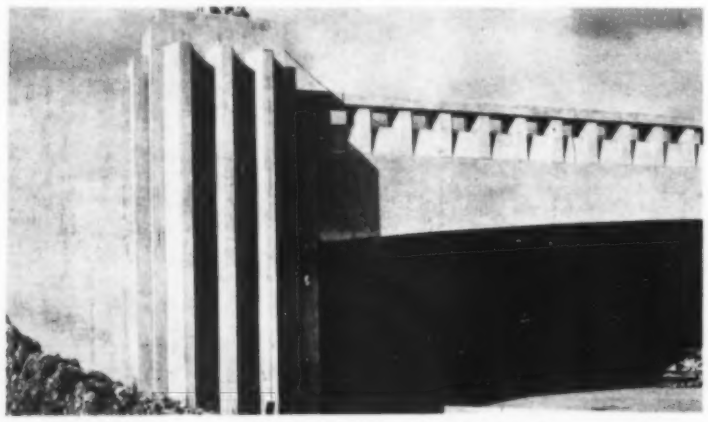
● The panels come sanded satin-smooth and oil-treated. They are also edge-sealed in a distinctive silver-green to insure against edge delamination and to make identification easy.

● Plyform serves as sheathing and lining combined.

● It simplifies form building, strips easily, minimizes finishing labor and gives multiple re-uses.

● The flawless concrete walls of the beautiful new Republic County (Kansas) Court House were poured against Plyform by the Peterson Construction Co. Mann & Co. was the architectural firm.

● In the extension of Chicago's Outer Drive through Lincoln Park, a number of new bridges and grade separation structures were required. The engineering department of the Chicago Park Division specified plywood forms throughout and got economical, time-saving performance with perfect concrete surfaces.

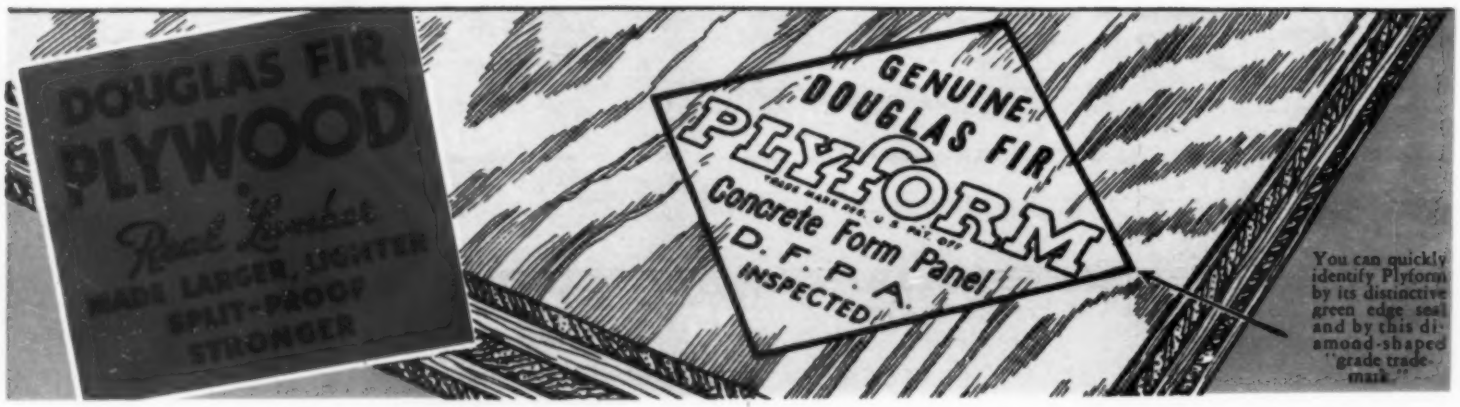


● Directly above is a close-up of one of the plywood-formed separation structures in Lincoln Park on Chicago's Outer Drive. The other photograph is the Lagoon Bridge on Fullerton Parkway.

● Concrete formed against Plyform has flawless beauty and long life. This is why facings are being omitted on a constantly increasing number of structures and the exposed concrete left as the exterior finish. In many cases, the interior concrete is not covered either. The concrete is merely painted.

Smooth, flowing concrete surfaces are easy to form against Plyform. Because the big panels combine amazing strength with light weight, carpentry and handling are greatly simplified. There is a minimum of jointing—and, as a result, a minimum of rubbing and finishing. Plyform's satin-smooth surface is uniform and non-absorbent. This means that concrete formed against Plyform is not mottled, stained or colored. Here's another economy: When handled with reasonable care, Plyform gives numerous re-uses. Then, when its form life is over, it can be salvaged for sub-flooring and other utility purposes.

Send now for free 12-page concrete form booklet that describes qualities, sizes, methods of application, suggestions for form building and other helpful information which will enable you to specify or use Plyform on your next job. Write today. Douglas Fir Plywood Association, Tacoma, Washington.



Here's why you get LOWER CABLE REPLACEMENT COSTS WITH HEIL TWIN-CABLE SCOOPS

Push-loading Heil Twin-Cable Scoop operations at Montgomery, Ala., Airport.

Heil Bulldozer used for log-piling in Ulster, England.

This 22½ Yard Heil Side Dump Unit hauls a 32-ton payload.

Heil Twin-Cable Scoops dump quickly and spread the load evenly.

Shorter Cable Lengths — Fewer Sheaves — and Jack-Arm Leverage Principle reduce Cable Replacements

Eliminate excessive cable replacement costs and increase your operating efficiency by switching to Heil Cable Scraper Equipment. The comparative chart below demonstrates that Heil Twin-Cable Scoops use shorter lengths of cable than other popular makes of scrapers. It shows, too, why cables last longer on Heil Scoops — Fewer sheaves and the elimination of reverse bends reduce the twisting and wearing action on cables and give you longer cable life. In addition, Heil design reduces line pull on the cables by using mechanical leverage to raise the bowl and to dump the load.

It will pay you to investigate these *extra features* of Heil Twin-Cable Scoops that make cables last longer and give you lower operating costs. See your nearest Heil distributor or write, wire or phone us today.

SCRAPER	No. of Sheaves	BOWL LIFT	Cable Req'd For 12-Yd. Unit	
			Lift Line	Dump Line
HEIL	18	Jack Arm & Cable	60 ft.	70 ft.
Scraper A	34	All-Cable	165 ft.	155 ft.
Scraper B	20	All-Cable	225 ft.	175 ft.
Scraper C	22	All-Cable	100 ft.	80 ft.
Scraper D	35	All-Cable	25 ft.	272 ft.
Scraper E	31	All-Cable	95 ft.	110 ft.

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SIMPLE . . .
RUGGED . . .
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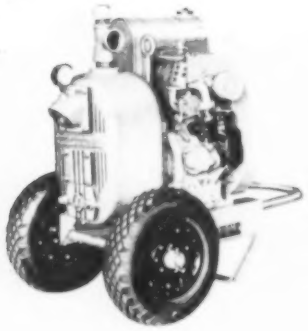
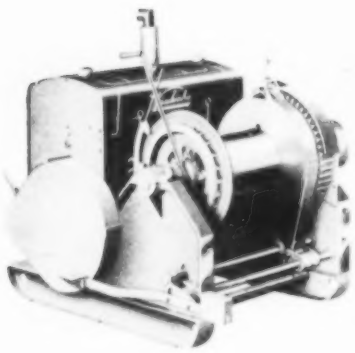
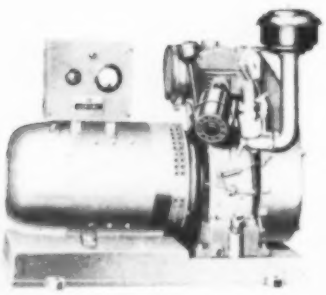


There's a Sterling Pump for every job—from 1½" to 10"—and there are several models and types in each size—low head pumps — medium head pumps — high head pumps.



Sterling Hoists are offered in a wide range of sizes and types. They have been carefully designed with the thought in mind that ease of operation, lubrication and maintenance tends toward better performance.



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★ Contractors everywhere have found they can do more work at less cost with Sterling Construction Equipment because

★ Sterling's Fully Developed, Thoroughly Tried and Proven Design assures *Dependable Performance.*

★ Write today for literature and prices on Sterling Pumps, Hoists and Light Plants.

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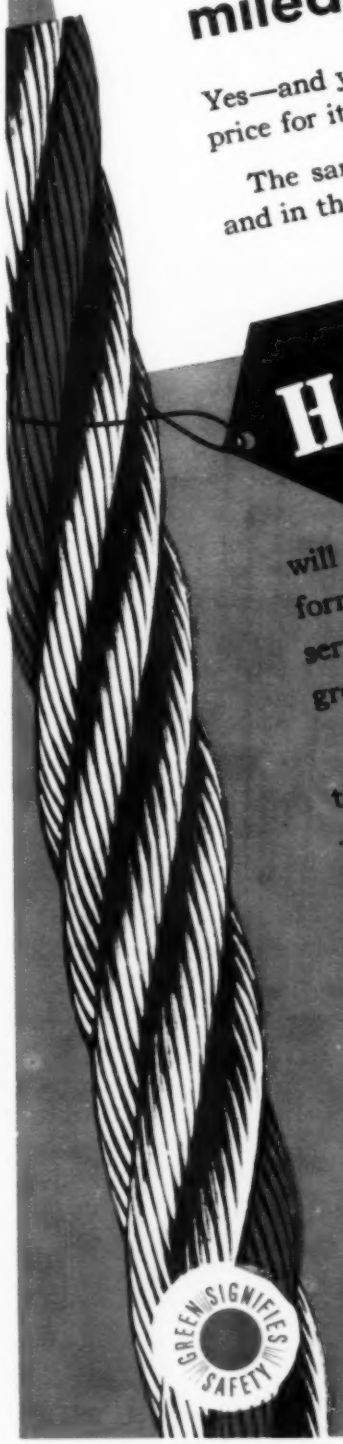
The same logic would apply to wire rope—and in that connection we offer—

HAZARD LAY-SET *Preformed*



• *Invariably*, Hazard LAY-SET Preformed will give far better and longer service, when compared with non-preformed rope. In many instances it has given much more than twice the service. The result is fewer machine shutdowns, steadier production, greater efficiency.

It is the preforming process which LAY-SET goes through at the mill that makes possible this superior service. Preforming relaxes the wires—relieves them of pent-up stresses—gives the rope extreme resistance to bending fatigue. It makes LAY-SET resist kinking and twisting; makes it easier, faster and safer to handle. It obviates the necessity for seizing the ends when being cut.

For longer and better rope service, for less "outage time" for machines and men, for greater safety to workmen—specify Hazard LAY-SET Preformed. All Hazard ropes identified by the Green Strand are made of Improved Plow Steel.

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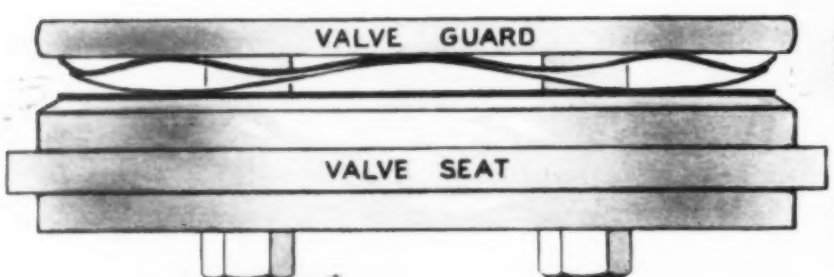
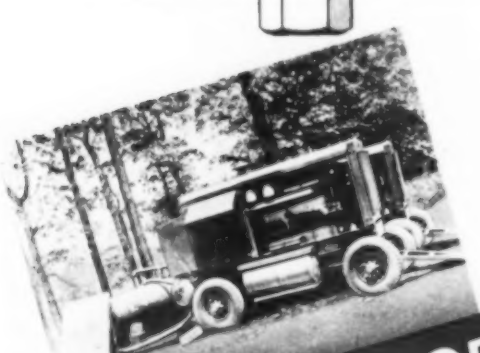
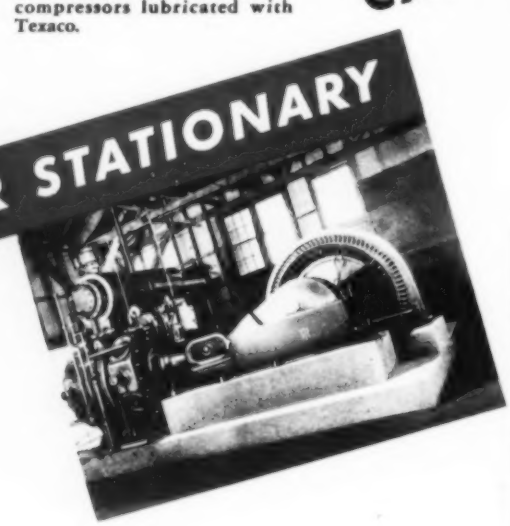


SULLIVAN "Dual-Cushion" valves securing variable spring tension by the use of wave-shaped springs and reaction plates. Valves of every design stay carbon-free, in compressors lubricated with Texaco.

CARBON JUST BLOWS AWAY



PORTABLE OR STATIONARY



VALVES WILL STAY CLEAN longer and air pressures will stay up . . . regardless of the size or type of compressors you operate when you use *Texaco Alcaid, Algol or Ursa Oils.*

Using *Texaco Alcaid, Algol or Ursa Oils* the little carbon that may form will be *soft* and *fluffy* . . . will be carried away with the compressed air. Highly resistant not only to carbon formation, but also to gumming and sludging, these oils assure efficient valves, longer service between inspections and cleanings.

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These Texaco users enjoy many benefits that can also be yours. A Texaco Lubrication Engineer will gladly cooperate . . . just phone the nearest of more than 2300 Texaco distributing plants in the 48 States, or write:

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★ More revenue airline miles in the U. S. are flown with Texaco than with any other brand.

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★ More Diesel horsepower on streamlined trains in the U. S. is lubricated with Texaco than with all other brands combined.

★ More locomotives and cars in the U. S. are lubricated with Texaco than with any other brand.

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RETURN METAL DRUMS PROMPTLY . . . thus helping to make present supply meet industry's needs and releasing metal for National Defense.

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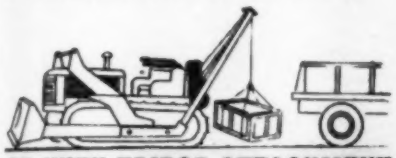
2. OPERATING WITH TRAIL BUILDER OR BULLDOZER UNITS
3. PULLING A THREE OR FIVE TOOTH RIPPER
4. OPERATING A PUSHER BEHIND SCRAPER
5. COMBINATIONS OF THE ABOVE



—OR WITH TRIPOD ATTACHMENT

6. PILE DRIVER
7. POST PULLER
8. POST SETTING
9. CULVERT PLACING
10. LOADING AND UNLOADING HEAVY EQUIPMENT
11. REMOVING OLD CULVERT ABUTMENTS FROM RIGHT OF WAY
12. PAVEMENT BREAKER (with nut-cracker)

—OR HOIST ONLY

13. CLEARING RIGHT OF WAY, STUMPS, TIMBER, ETC.
14. STOCKPILING DEBRIS FROM RIGHT OF WAY
15. UPROOTING TREES
16. MISCELLANEOUS HOISTING
17. FREEING BOGGED DOWN WHEEL TYPE EQUIPMENT
18. HANDLING SKID-MOUNTED EQUIPMENT UNDER DIFFICULT CONDITIONS
19. OPERATING DOUBLE LINE CABLEWAY DRAG SCRAPER
20. PULLING CABLES THROUGH CONDUITS

Cut Them with Buckeye Power Control Units!

FOR lightning-fast, finger tip action and power to spare, put Buckeye Hoists on your tractors. They give you these cost-cutting advantages:

FIT ANY MAKE AND MODEL OF TRACTOR—Adaptors supplied for easy mounting — no cutting or drilling required.

CHOICE OF SINGLE OR DOUBLE DRUM—Single drum model operates bulldozer or single line equipment towed by tractor drawbar. Double drum model operates double line scrapers, etc., or a combination of bulldozer and single line equipment.

NO JERK ON LINE—Clutches and brakes take hold of load smoothly — no jerking impact, thus smaller, less expensive cable can be used, that is $\frac{3}{8}''$ to $\frac{1}{2}''$ in place of $\frac{5}{8}''$ and $\frac{9}{16}''$ often used.

SWINGING FAIRLEADS—Swing in excess of 180° - correct design minimizes cable wear.

LONG LIFE BRAKE AND CLUTCH BANDS—Interchangeable, easily removable molded block type, guaranteed unconditionally for 500 hours.

EASY ADJUSTMENT—Only two simple adjustments required for each drum.

EASY OPERATION—Controls placed in easy reach—minimum of effort required for fast action.

CORRECT GEAR RATIOS—For best line speed.

LOW CENTER OF LINE PULL—Keeps tractor in balance at all times.

Complete specifications available on request. Write to Buckeye today.

BUCKEYE TRACTION DITCHER COMPANY, Findlay, Ohio

Built by Buckeye

Convertible Shovels

Trenchers

Tractor Equipment

R-B Finegraders

Road Wideners

Spreaders

★★ FINAL STOCKS

EVENING

PHILADELPHIA, THURSDAY, AUGUST 21, 1941

VOL. CCXI, NO. 128

16 FELLED BY POISON SMOKE

Priest Saves Fireman As 3-Alarm Blaze Hits West Phila. School

Nuns Give Warning; Spontaneous Combustion Blamed

Sixteen firemen were overcome by dense, acrid smoke as a three-alarm fire swept the basement of the school of the Church of the Transfiguration, Cedar Ave., between 55th and 56th Sts., at 1 P. M. this afternoon.

The fumes, as instantaneous in effect as a poison gas attack, felled the firemen as soon as they entered the building. The deadly nature of the smoke apparently was caused by chemicals with which some tents in the basement had been treated.

The fire started in the west end of the basement and, according to ob-

"There was considerable camping equipment, including tents, stored in the basement," he said. "These tents apparently were damp when they were stored away, and this created a tremendous heat that automatically set them afire. The deadly smoke, some of the worst in my history as a fire fighter, was caused by the waterproofing chemicals with which these tents were treated."

By the time firemen arrived the smoke was so dense that it had spread over half a dozen blocks. Second and third alarms were quickly sounded.

When the first firemen entered the basement, smoke drove them back. They forced their way in, and the majority of those overcome were in this detachment.

The casualties came so rapidly that extra hospital and police ambulances were called to handle the situation. However, all the stricken men were taken to [illegible] Hospital.

Clouds of Smoke Obscure Blazing Parish School

Leiter Photo

The school of the Church of the Transfiguration, 55th St. and Cedar Ave., is enveloped by smoke during a fire in which many firemen were overcome this afternoon

Flammable Canvas *Does it Again*

FIRE CHIEF Finished Duck would have prevented this needless loss and damage — made unnecessary human suffering caused by poisonous fumes that overcame 16 firemen fighting this 3-alarm School Building fire.

Wherever unprotected canvas or even more dangerous flammable "waterproofed" duck presents a fire hazard from spontaneous combustion, carelessly thrown cigarettes, hot coals, sparks, hot rivets, welding operations, workmen's torches or other causes — FIRE CHIEF Finished Duck assures new safety.

Approved by the Underwriters Laboratories and the Factory Mutual Fire Insurance Companies, FIRE CHIEF also meets all Government requirements for a fire-, water-, weather- and mildew-resistant canvas.

Specify FIRE CHIEF and be sure.

WM. E. HOOPER & SONS CO.
New York PHILADELPHIA Chicago
Mills: WOODBERRY, BALTIMORE, MD.

FIRE CHIEF *The Finish That WON'T WASH OUT*

WHAT makes a REAL ROCK SHOVEL?

BOOM

No welded shovel boom of Northwest design and construction has ever failed!

STICKS

Welded, rugged, no racks, no holes to weaken the structure.

DUAL INDEPENDENT CROWD

Independent plus automatic—utilizes force other shovels waste—handles harder digging and more yards per hour.

CUSHION CLUTCH

reduces strains on all parts under power and cuts maintenance and production costs.

UNIFORM PRESSURE SWING CLUTCHES

No jerks, no grabs spotting heavy dipper loads—less adjustment—longer life.

DIFFERENTIAL STEERING

means positive traction while turning as well as when going straight ahead.

NORTHWEST ENGINEERING CO.
1728 Steger Bldg. 28 E. Jackson Blvd.
Chicago, Illinois

-and when you have a real Rock Shovel you won't have to worry about output in dirt

NORTHWEST

Built in a range of 18 SIZES 3/8 yd. capacity and Larger

● **ST. MARY'S HOSPITAL,** Rochester, Minn.—Saved two sets of forms; heating costs cut; work not interrupted by severe winter of 1939-40; forms safely removed in 3 days instead of 28.

"Same old story," say McGough Bros., "Lehigh Early always saves us money!"

Money is not all, though, that the use of Lehigh Early Strength Cement saves these Minnesota contractors. Up there where winter doesn't fool, they've got to have safe winter concreting. And to get the speed they want, they've got to have uninterrupted building schedules. On job after job, McGough Bros. use Lehigh Early to accomplish these results. On every job of theirs to date it has come through.

Sure it has. For Lehigh Early is the cement that in 24 to 48 hours equals the strength of normal cement at 7 days. Naturally, with this safe speed, danger of frost damage is sharply cut, as is the cost of heat protection.

But winter *or* summer, this quicker readiness of concrete permits economies no competitive-minded contractor can ignore. The Lehigh Service Department will gladly provide more proof, on request, of the time-and-money saving performances of Lehigh Early Strength Cement.

Lehigh

EARLY STRENGTH CEMENT

for service-strength concrete in a hurry

● **HIGH SCHOOL ADDITION,** Jackson, Mich.—4 weeks' quicker completion, forms cost cut 1/3.

● **HOLY SPIRIT SCHOOL,** St. Paul, Minn.—Form lumber cost reduced by $500, general overhead by same amount.

● **VILLA SANCTA SCHOLASTICA,** Duluth, Minn. Concreting safely done in sub-zero weather; heat protection costs cut 2/3; form sets reduced from 3 to 2.

LEHIGH PORTLAND CEMENT COMPANY • ALLENTOWN, PA. • CHICAGO, ILL. • SPOKANE, WASH.

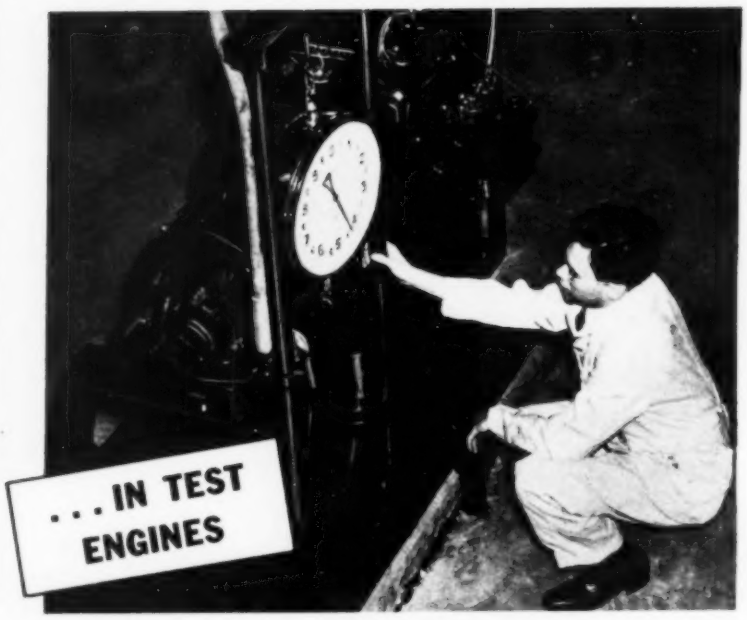
ROEBLING *Looks Ahead*

TO A SECOND CENTURY OF PIONEERING!

The past—despite its achievement—is *behind*. The opportunity to continue to grow, to further achieve, to serve industry in even greater measure, is *in the future*.

» » That is why Roebling—at the celebration of its 100th Anniversary—LOOKS AHEAD—looks ahead with confidence to new opportunities to Pioneer in Wire—new opportunities to develop the finest wire and wire products that aggressive research, unequalled experience, and the most modern of manufacturing facilities can make possible.

PROVED!



NEW
SHELL RUDIS OIL
The Oil that can take it

THAT'S the story of the new Shell Rudis Oil. Tests, made by competent, independent engine authorities, prove that the new Shell Rudis Oil . . .

1—Has high oxidation stability under most severe temperature conditions.
2—Keeps rings and pistons free.
3—Is non-corrosive to bearing metals.
4—Reduces sludge formation.
5—Cuts down engine wear.

Try Shell Rudis Oil in your engines today.

SHELL

NEW SHELL RUDIS OIL *FOR HEAVY DUTY*

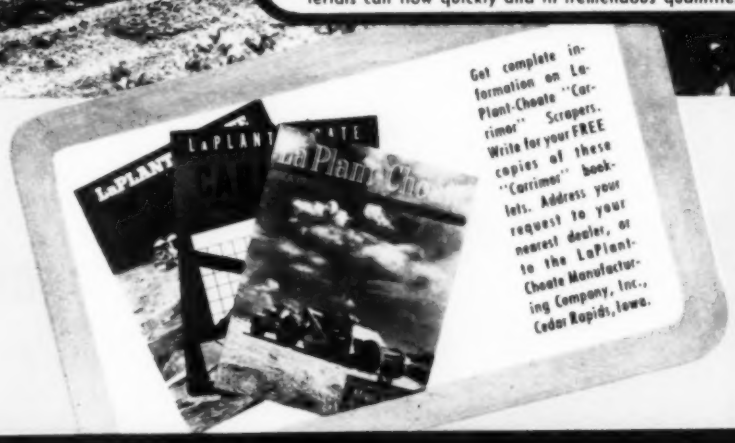
SPEED with Dependability on Every Job!

with LAPLANT-CHOATE CARRIMOR Scrapers

AIRPORTS FOR DEFENSE
. . . are rushed to completion with this new, *high speed*, large capacity LaPlant-Choate CW-10 "Carrimor" scraper and "Caterpillar" DW-10 Diesel Tractor.

HOUSING FOR DEFENSE
. . . is *speeded up* with heaping loads of earth moving off to the fill with clock-like regularity. Time is short!

HIGHWAYS FOR DEFENSE
. . . are *driven* through hills, valleys, and plains to provide a complete network over which defense materials can flow quickly and in tremendous quantities.



WITH contractors straining every muscle to complete all jobs ahead of schedule, dependable equipment is in greater demand than ever before . . . speed is of utmost importance! Top-notch earthmovers everywhere demand LaPlant-Choate tools. They know that the *right design*, the *best materials*, and the *finest workmanship* go into every machine. They know that versatility is but one of their many advantages . . . that the same hydraulic system on the tractor will handle bulldozers, trailbuilders, and Carrimor scrapers . . . that they are simple, easy to operate, and efficient. They know, too, that LaPlant-Choate builds a machine for every earthmoving job and a machine for every size "Caterpillar" tractor. TRY ONE ON YOUR JOB.

LaPLANT-CHOATE

Factory & Home Office Cedar Rapids, Iowa — *Manufacturing Co.* INC. — Pacific Coast Offices: San Leandro, Cal

EARTH MOVING - LAND CLEARING - SNOW REMOVAL EQUIPMENT

FREE—

RIGGERS' Hand Book

You'll use this practical wire rope information often. 96 handy pages of facts, tables, illustrations. Send for your free copy *today!*

The boy with a mechanical turn of mind, playing with toy shovel or crane, may even now be constructing his future career. And whether he becomes a general contractor, road builder or industrial engineer, he will employ giant power equipment, as you do, to create better living for everyone.

In the serious real-life business of keeping construction under way, Yellow Strand Preformed Wire Rope is one of the mainstays. Its rugged *endurance* especially fits it for heavy duty on shovels, draglines, scrapers and other machines. Through skillful balancing of elasticity, toughness, strength, it keeps them in *productive* service by reducing shutdowns.

With Yellow Strand on the job, you can speed up faster under full load, handle more pay-tons or pay-yards, because every reel is practically pre-broken-in. The preforming makes a limber, smooth-running line that's easy to socket and splice; one that protects hands and sheaves from wickering, that resists kinking, drum crushing and bending fatigue.

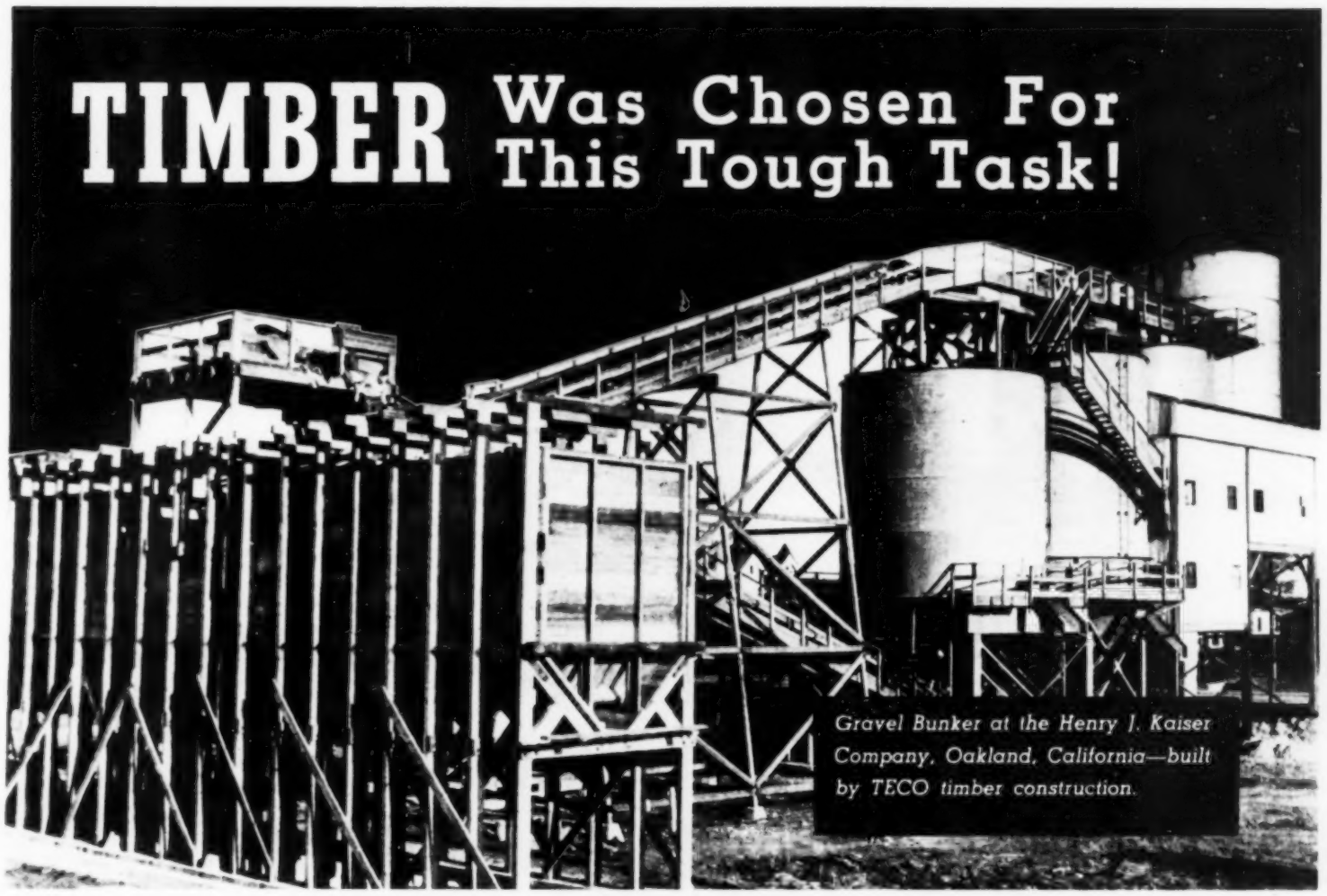
Put these premium qualities to work for you by installing Preformed Yellow Strand the next time you need wire rope. Its long life, its low *final* cost, will loom up when you figure the profits.

BRODERICK & BASCOM ROPE CO., ST. LOUIS
Branches: New York, Chicago, Houston, Portland, Seattle • • *Factories:* St. Louis, Seattle, Peoria

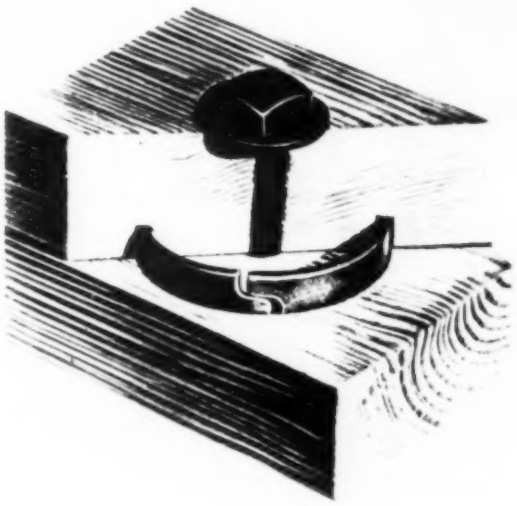
YELLOW STRAND
Preformed WIRE ROPE

A Mainstay of Industry, Which Benefits the Public Through Its Service to GENERAL CONTRACTORS • ROAD BUILDERS ROTARY DRILLERS • PLANT ENGINEERS • LOGGERS • MINERS • QUARRY OPERATORS and OTHER INDUSTRIAL SERVANTS

TIMBER Was Chosen For This Tough Task!



Gravel Bunker at the Henry J. Kaiser Company, Oakland, California—built by TECO timber construction.



Where Toughness Counts .. Count on Timber!

Few raw materials, by bulk, are heavier and rougher than gravel.

Gravel bunkers must take constant pounding, grinding and thumping and support a pressure that only the toughest construction could stand.

The TECO System of timber construction builds bunkers that can "take it". TECO Connectors bring the whole toughness of timber into play by strengthening the joints to stand greater stresses.

Send the coupon for detailed information as to how TECO Connectors can help in *your* construction problems!

THE *TECO* RING *CONNECTOR spreads the load on a timber joint over practically the entire cross-section of the wood . . . brings the full structural strength of lumber into play.*

TIMBER ENGINEERING COMPANY, INC.
1337 Connecticut Avenue
Washington, D. C.

Tear Out . . . . MAIL TODAY!

Timber Engineering Company, Inc., Dept. M-12
1337 Connecticut Avenue, Washington, D. C.

Please send us complete information on the TECO Connector System of timber construction.

Individual .....

Firm .....

Street .....

City ..... State .....

DEFENSE

won't wait for weather!

In the first nine months of 1941 the men and machines of America's earth-moving industry have dug, scraped, hauled and bulldozed more than 800,000,000 cubic yards of dirt and rock — all on defense work!

The fact that much of this immense yardage has been handled under the toughest kind of conditions is a tribute to the rugged power, traction and stamina of "Caterpillar" Diesel Tractors and Motor Graders. These sturdy machines ask no favors of terrain or weather. In deep, soft mud, on sun-baked clay or frozen ground, they come out slugging, right from the bell.

The broad steel tracks of a "Caterpillar" Diesel Tractor furnish solid footing for its tremendous engine power, and the final drive is protected from mud, water and grit by copper bellows-seals. Balancing engine weight over the drive wheels gives a "Caterpillar" Diesel Motor Grader its unbeatable tractive power. Both machines start fast and run smoothly whether the temperature is zero or 100. And both operate with better-than-average Diesel economy because they use the cheaper grades of fuel.

Most important of all, *they're built to stand up under punishment* — to work day and night, month after month, with a minimum of lost time.

Every minute counts in the present emergency, and "Caterpillar" dependability has a vital part in licking America's biggest job.

CATERPILLAR TRACTOR CO., PEORIA, ILL.

CATERPILLAR ★
REG. U.S. PAT. OFF.

ENGINES AND ELECTRIC SETS *DIESEL*

TRACK-TYPE TRACTORS • ROAD MACHINERY

Under a scorching sub-tropic sun this "Caterpillar" Diesel No. 12 Motor Grader windrows dirt for airport construction at Felton Field, Pensacola, Florida. Dual engine cooling keeps both water and oil at the proper temperature.

A "Caterpillar" Diesel No. 12 Motor Grader building road through a swampy area at the Aberdeen Proving Grounds.

At the U. S. Army Proving Grounds, Aberdeen, Maryland, a "Caterpillar" Diesel D7 Tractor with LaPlant-Choate bulldozer works in heavy March mud.

NO. 573-C

INNER WIRES ARE EXTREMELY FLEXIBLE. They're drawn in a special way to make them extra strong, extra pliable. They're improved plow steel too. They bend easily over your sheaves and drums. These wires are the reserve strength of Monarch Whyte Strand PREformed.

OUTER WIRES ARE EXTRA TOUGH. These wires are improved plow steel, specially drawn for outside service . . . made to provide better abrasion resistance. They are Monarch Whyte Strand PREformed's "first line of defense"... that's why we give them a *tough* abrasion resisting skin.

And then to provide for EXTRA long life, every wire in Monarch Whyte Strand is thoroughly covered with a special lubricant which protects unseen, inside surfaces against corrosion and friction. This better wire rope is available from stock in the correct size, grade and construction.

Your equipment may be similar to hundreds of others. *Take advantage* of the experiences of others having equipment like yours—ask for a Macwhyte recommendation of the rope that has proved itself to be the best for your equipment.

MACWHYTE COMPANY, *2941 Fourteenth Avenue, Kenosha, Wisconsin*
Manufacturers of wire rope to meet every need — left-&-right lay braided slings — Stainless Steel wire rope — Aircraft cable, Aircraft tie rods, and "Safe-Lock" Swaged Terminals. · *New York Pittsburgh · Chicago · Ft. Worth · Portland · Seattle · San Francisco. Distributors throughout the U. S. A.*

MACWHYTE EXCAVATOR ROPES

The correct ropes for your equipment

TESTED INTERNALLY LUBRICATED PROVED

PRE-FORMED FOR BEST PERFORMANCE

It's the "DIGGINEST" 3/4 YD. DRAGLINE You Ever Saw!

That's the verdict of many dragline experts after putting the Lorain-40A through its paces. They have sent this machine into treacherous swamps—highballed it rough-shod cross country to prove its travelability. They have dug everything from the softest muck to the toughest clay with the boom at all angles, and got better than average production. Yes, they have even checked drag cable costs and found that the "40A" was saving them money.

A few of the features that make for such outstanding performance are listed briefly on this page. Complete information on these and other factors that have won this 3/4-yd. machine the reputation of being the "digginest" dragline in its class is contained in the new Lorain-40A catalog. Write for your copy today.

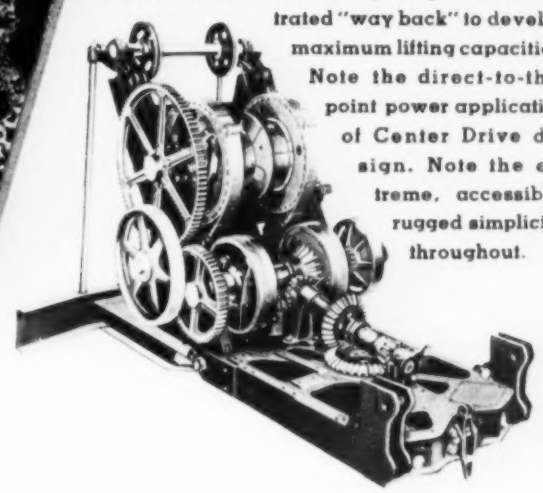
UNIVERSAL CRANE DIVISION · THE THEW SHOVEL CO.
LORAIN, OHIO

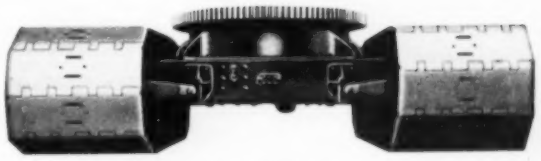
THEW CENTER DRIVE REG. U.S. PAT. OFF.

3/4 YD. LORAIN 40A

BALANCED TURNTABLE

Balance—Power—Simplicity—all in one turntable. Note how machinery weight is concentrated "way back" to develop maximum lifting capacities. Note the direct-to-the-point power application of Center Drive design. Note the extreme, accessible, rugged simplicity throughout.



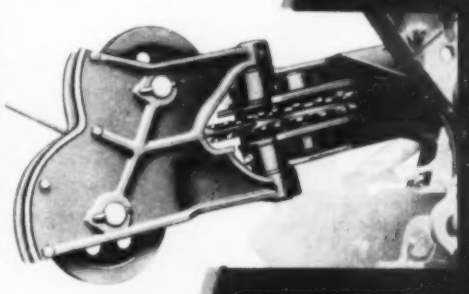


2-SPEED CRAWLER

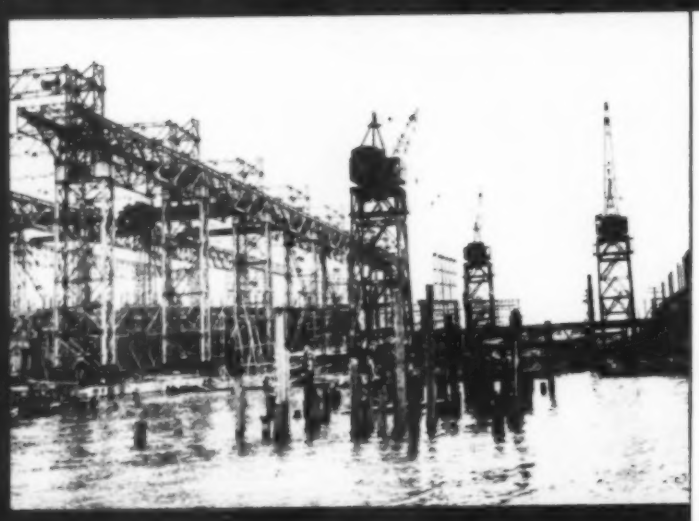
Center Drive design for simplicity and ruggedness of construction. 2 speeds in either direction with all steering controlled from operator's position. Extra wide swamp pads give "soft ground flotation" without sacrifice of crawler mobility.

"CABLE MISER" FAIRLEAD

This patented dragline fairlead reduces cable wear two ways—(1) the two front sheaves are free to swivel, and thus maintain a constant direct lead from bucket to sheaves; (2) the rear horizontal sheaves have geared flanges so that when one revolves the other also turns, thereby eliminating destructive cable scrubbing.

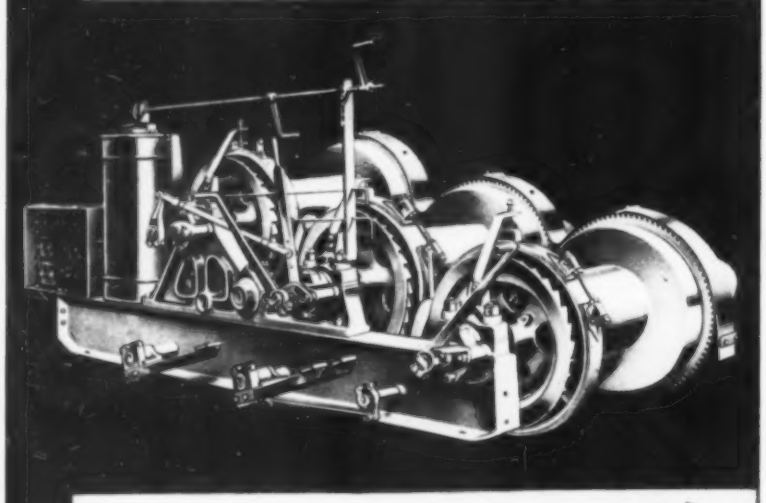


FOR "HE-MAN" CONSTRUCTION JOBS

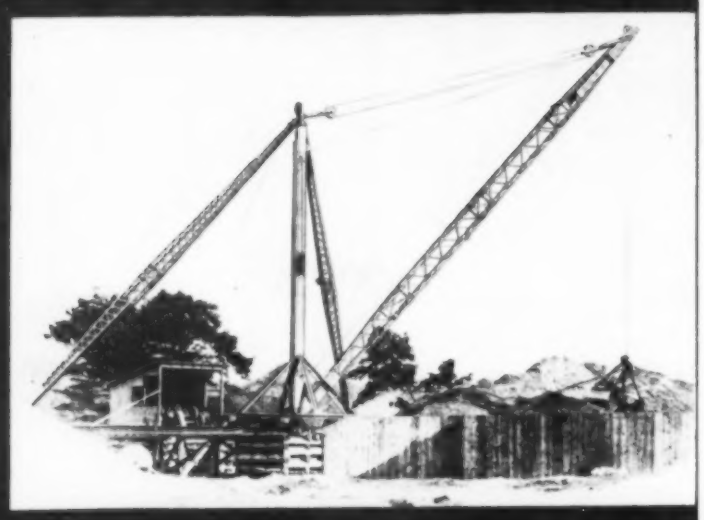


When the going is tough and you have a big job on your hands . . . then, more than ever, you'll need Clyde Quality Equipment. Hoists, Derricks and Whirleys that are designed to perform and built to endure . . . real "he-man" equipment for "he-man" jobs.

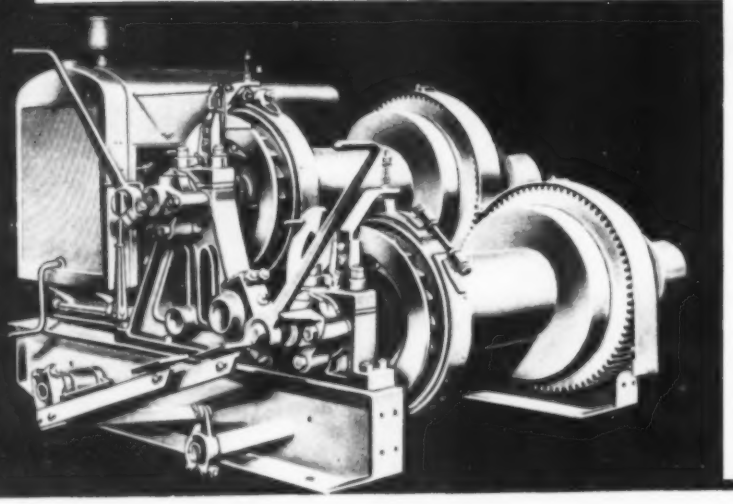
Clyde Whirleys . . . scientifically engineered to keep pace with the fast moving schedule of today's huge construction projects . . . ships, dams, locks or bridges. Seven standard sizes with lifting capacities up to 140,000 lbs. at a 35 ft. boom radius and 22,000 lbs. at 150 ft. Power can be electric, Diesel, steam, gasoline or Diesel-electric. Write for Bulletin K-12.



Clyde Electric Hoists are available in one, two and three drum types in sizes from 5 to 200 H.P. with line pulls from 1,000 lbs. to 20,000 lbs. They are built with generous, easily adjusted brakes and frictions, wide bearings, husky shafts, rigid, one piece steel bed frame . . . important factors toward greater safety, efficiency and economy of operation. Bulletin K-3 contains complete specifications.



Clyde Steel Derricks are designed to meet all the requirements in the construction and industrial field for high quality, dependable derricks. All details have been given careful consideration in regard to materials, design and workmanship. Clyde guy and stiffleg derricks range in capacities from one to 100 tons with boom lengths from 20 to 100 ft. Write for Bulletin K-9 for detailed information.



Clyde Gasoline Hoists are also built in one, two and three drum types in sizes from 8 to 120 H.P. and with line pulls from 1500 lbs. to 14,000 lbs. Similar in design to Clyde electric hoists, they embody the same outstanding feature that make Clyde hoists first in the field. For details of construction and complete specifications, write for Bulletin K-4.

CLYDE

CLYDE IRON WORKS, INC.

DULUTH, MINN.

SAVE WITH TRACKS

...be the "*boss*" over ALL Hauling Conditions

Uniform production is assured with Athey Trailers and "Caterpillar" Diesel Tractors on this Tennessee defense project where a fleet of these units keeps going 24 hours a day—making every hour count with full loads and fast hauling.

KEEP DEFENSE JOBS MOVING

with All-Job ATHEY TRAILERS

PUT your loads on dependable Athey Trailers and gain many savings. For one thing, you'll be far ahead with their steady, uniform production which they maintain regardless of footing or weather. Save precious days, too, when weather turns against you because "the show goes on" with Athey Trailers.

You'll save by hauling more yardage at higher speeds through adverse traction conditions.

Another savings is haul roads—you don't have to go to the expense of building and maintaining them. Then, there's less equipment upkeep expense because there's nothing on Athey Trailers to puncture, rip or cut in sharp rocks.

Athey Trailers are "work insurance"—they put more security into your job, take away the threat of interrupted output. See your "Caterpillar" dealer today, or write Athey Truss Wheel Co., 5631 W. 65th St., Chicago, Illinois, for full facts.

ATHEY

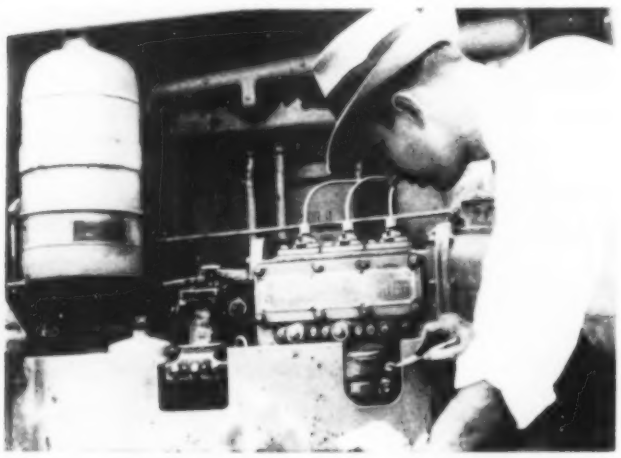
IMPORTANT TO OPERATORS OF DIESEL-POWERED FLEETS

—NOT ONE MINUTE'S DELAY —NOT A CENT FOR REPAIRS

IN 3,000 HOURS OF TRACTOR OPERATION

Complete failure of the engine in a road maintenance tractor forced a Missouri Road District to replace it.

No chance of another failure was taken when a new Diesel tractor was delivered. A Standard Automotive Engineer was called in for his recommendations. Standard Diesel Fuel and RPM DELO were used. There is no guess work about how these products and tractor have performed. The last reading on the



Automotive Engineer pointing to hour meter on Diesel tractor which indicates accumulated operating time.

hour meter with which the engine is equipped shows 3,054 hours of operation. There have been no delays for repairs and not one cent of maintenance expense.

NO RING STICKING IN 16 YEARS ON DIESEL-POWERED DRAGLINE

In sixteen years, countless thousands of hours of operation have been piled up by the 120 H. P., 2-cycle Diesel in this dragline. C. C. Davenport has operated this unit for the Stiers Bros. Construction Co., St. Louis, Missouri, since it was erected. He can tell you how Nonpareil Diesel Oil has helped him keep this engine on the job and lightened his maintenance work.

Except for two or three occasions when other Diesel oils were tested, he has never had a stuck ring. In the sixteen years, the cylinders have been rebored just once. During this time the engine has operated near its maximum capacity, handling a 6 cu. yd. bucket on a 90 ft. boom, when it was originally designed for a 3 cu. yd. bucket and a 70 ft. boom.

Let a Standard Oil Engineer help you put your gasoline or Diesel-powered construction equipment in tip-top shape for the big season ahead. With his instruments for checking and adjusting engines and his knowledge of lubricants and fuels, he can help you avoid breakdowns and delays for making repairs when you want every piece of equipment on the job.

If you operate in the Middle West, or plan on taking over a contract in this area, look up the nearest Standard Oil Automotive Engineer now. He'll not only recommend the products you need, but he'll see that you get them where you want them when they're needed.

HERE'S WHERE YOU'LL FIND A STANDARD OIL ENGINEER

Write to the nearest local Standard Oil Company (Indiana) office listed below or 910 South Michigan Avenue, Chicago, Illinois. In Nebraska, write Standard Oil Company of Nebraska at Omaha.

COLORADO
Denver

ILLINOIS
Chicago
Decatur
Joliet
Peoria
Quincy

INDIANA
Evansville
Indianapolis
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★ But preformed wire rope does far more than that. By lasting longer, it conserves steel, and steel is a vital necessity to America today. Anything that helps conserve steel for America is of itself a vital necessity.

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SHOVELS, trucks, bulldozers, rollers, and crushers can do their best work only when blasting leads the way.

Good blasting makes excavating equipment sing a profit-song that's music to the contractor's ears—

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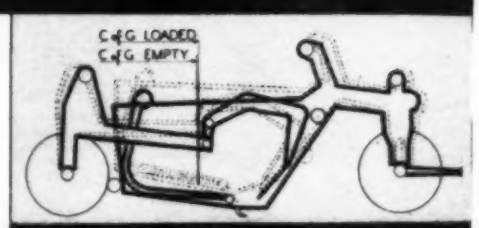
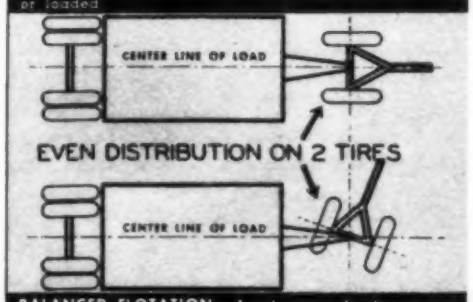
A SCRAPER that stays on top when the going gets tough . . . that can make short, non-stop turns . . . that handles easily on steep slopes — that's the scraper that produces.

This ability to "stay put" is basic in the design of Bucyrus-Erie 4-Wheel Scrapers. (See illustrations and drawings). It is one of the important reasons why operators prefer them.

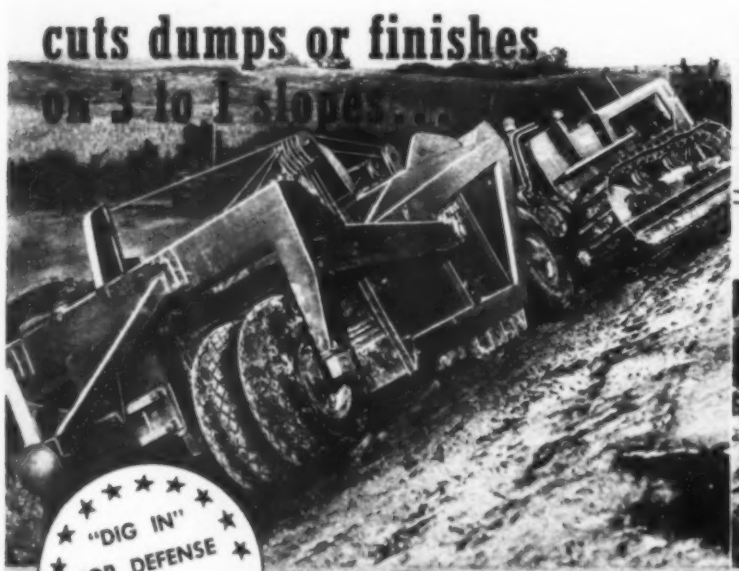
In addition, Bucyrus-Erie 4-Wheel Scrapers have the **double-curve cutting edge** which "boils" the dirt into the bowl for fast easy loading; **positive rolling ejection** by means of the tilting bowl which requires but a minimum of power to dump the load cleanly; **independent control of the cutting edge** for smooth, accurate grading; and many other features that produce big output at low cost. — Bucyrus-Erie Company, South Milwaukee, Wisconsin.



LOW CENTER OF GRAVITY—There are no dead weight superstructures and no heavy, complicated control mechanisms. Horizontal center of gravity is practically the same whether the scraper is empty or loaded.



BALANCED FLOTATION—Load is evenly distributed so that each pair of wheels carries its share of the weight. Wide spread of rear wheels provides maximum resistance to overturning. Center of balance of weight on front axle does not change when front wheels are turned.



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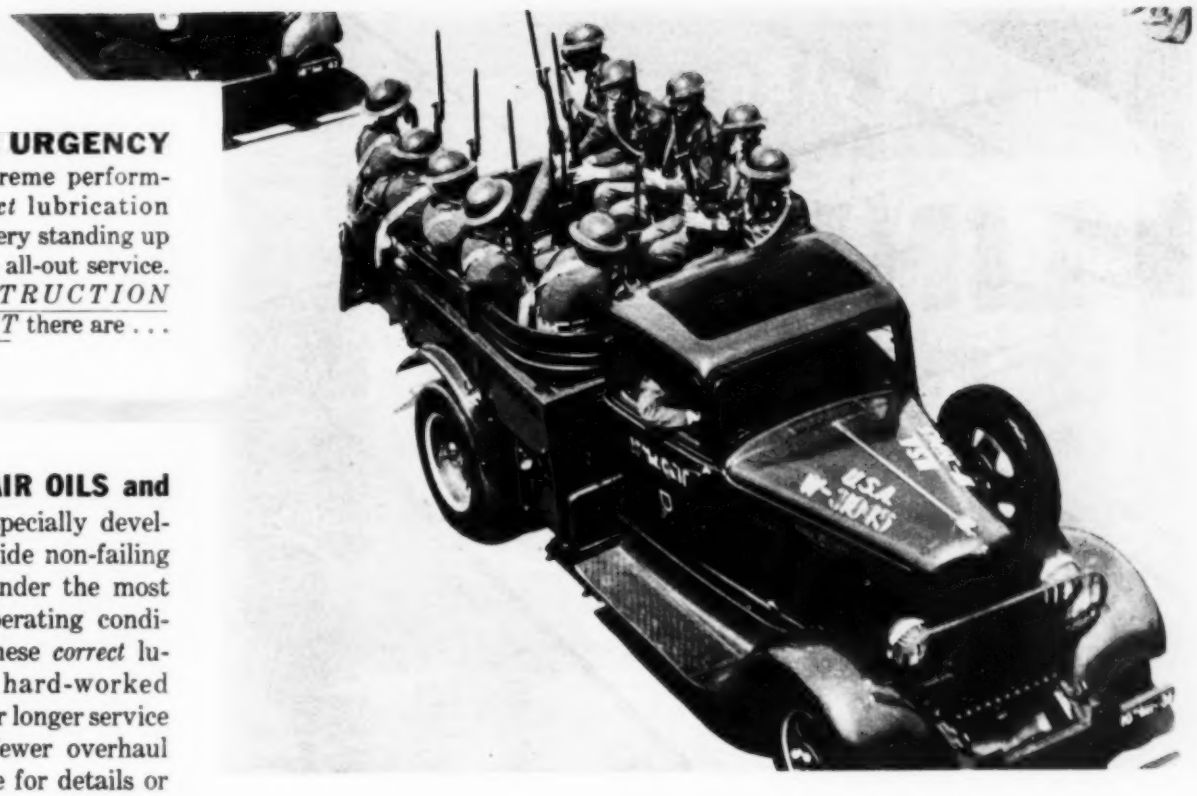

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Write for "The Service Factor"—a free publication devoted to the solution of lubricating problems.

EQUIPMENT *at plant of Standard Materials Corporation, Hanover, Ind., furnishing hundreds of thousands of tons of sand and gravel for defense purposes. Sinclair products used.*

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Taking terrific punishment digging and loading in a stone quarry is routine work for the big, husky 1½ yard shovel shown at the right. Speed-o-Matic hydraulic power control actuates clutches faster and smoother—enables the operator to maintain top-speed, full capacity loading throughout the day.

A direct contrast is the pipe line job shown. Here soft ground conditions call for a highly mobile, light weight excavator. Ideally suited for the job, Link-Belt Speeder's ⅜ yard machine is digging the trench. Tractor type treads on this machine not only give exceptionally good traction, but enable it to travel at higher rates of speed—important in pipe-line work.

There is an excavator in Link-Belt Speeder's line to suit your needs, too. Write today for full particulars. Machines range in size from ⅜ to 3 yard capacity—all fully convertible.

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Builders of the Most Complete Line of Shovels and Cranes

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STRONG AS AN OX. . . .

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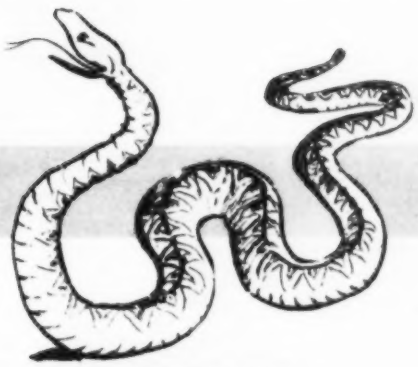

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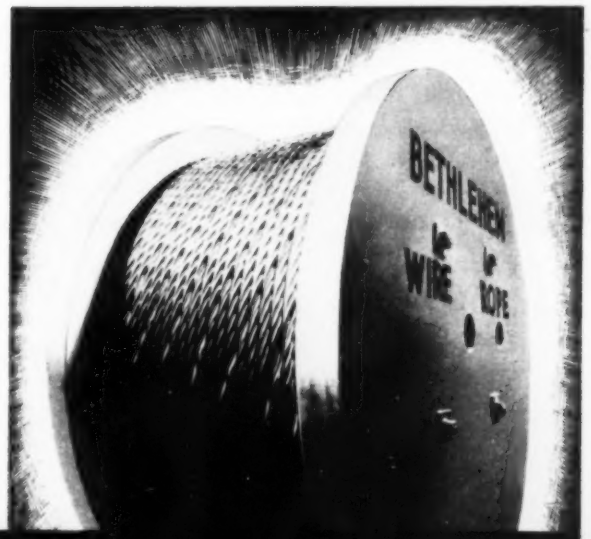
WIRE ROPE

Rugged strength and smooth, easy handling get together in Purple Strand Form-set wire rope.

The Purple Strand means that the rope is 100 per cent Improved Plow Steel, the strongest, toughest steel used in making wire rope. The Form-set (preformed) construction means that the rope is easy to handle, won't wicker, spools smoother, is more resistant to bending fatigue.

Next time you buy wire rope for a hard-running job . . . look for the Purple Strand, and then say "Form-set." You'll be getting a combination of strength and ease of handling that's hard to beat.



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IT BEATS THEM ALL

where the going's toughest!

THIS new Goodyear Hard Rock Lug tire has been put to the test in the toughest service conditions we could find—in rock excavations for highways and public works, in logging, in strip mines—wherever tires customarily take a beating.

Now, after two years, the results speak for themselves! On all these jobs this rugged performer has far surpassed conventional rock tires—on every count.

Because its non-skid tread is upwards of 30% deeper—its service life is far longer.

Its broader, flatter lug bars provide stauncher resistance to cuts and abrasion. The separate lug design gives far greater traction than other rock type treads.

Its carcass is made of the highest-tensile cord we've ever put into a heavy-duty tire—further assurance of long wear and protection against scuffing and bruising.

Above all, the Goodyear Hard Rock Lug tire is bigger, sturdier all around—wider in cross-section, with heavier beads—yet, it costs you no more than ordinary rock tires. And when you figure its greater mileage—the saving is considerable.

Goodyear Hard Rock Lug tires are available in all popular sizes up to 21.00-24. Your Goodyear dealer has them now.

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Construction Methods

ROBERT K. TOMLIN, Editor

Volume 23 | DECEMBER, 1941 | Number 12

TOWER-MIXER PLANT, mounted on truck and powered by truck engine, mixes 2-yd. batch for delivery by tower hopper to 4-yd. Smith mixer on truck equipped with crawler tracks around wheels of dual rear axles for travel on soft ground at Curtiss-Wright plant, Columbus, Ohio.

TO FILL CONCRETE CARTS on ground, tower hopper delivers through chute to portable, wheel-mounted hopper equipped with two discharge gates for loading pair of buggies simultaneously.

Truck-Mounted Tower-Mixer Units

Produce Concrete for Aircraft Plant

CHARGING SKIP hoisted by power takeoff from truck engine dumps 2-yd. batch into big drum mounted with tower on same truck. One operator controls charging skip, mixing drum and tower hoist bucket, all of which are driven from truck engine through power takeoffs.

TO MIX 50,000 CU.YD. OF CONCRETE for a 25-acre, $10,000,000 Curtiss-Wright airplane plant designed by Albert Kahn Associated Architects & Engineers, Inc., and erected at Port Columbus, Columbus, Ohio, the Darin & Armstrong Co., contractor, Detroit, operated two portable Mixermobile 2-yd. tower-mixer units, mounted on trucks and powered by the truck engines. Set up in semi-permanent locations, the mixers turned out 2-yd. batches which were hoisted by the tower buckets to charge 4-yd. truck-mixers, operated as agitators, or concrete buggies delivering to the forms. Photographs illustrate these uses of the two portable mixing plants. The contractor expected to produce more than 100 cu.yd. of concrete per hour with the two plants to meet the fast construction schedule on the job.

All three motions of the Mixermobile plant—hoisting the charging skip, operating the mixer drum and raising the tower bucket—were controlled by one man. Capacity of the tower bucket was ½ yd. For accurate measuring of water, each unit was equipped with a

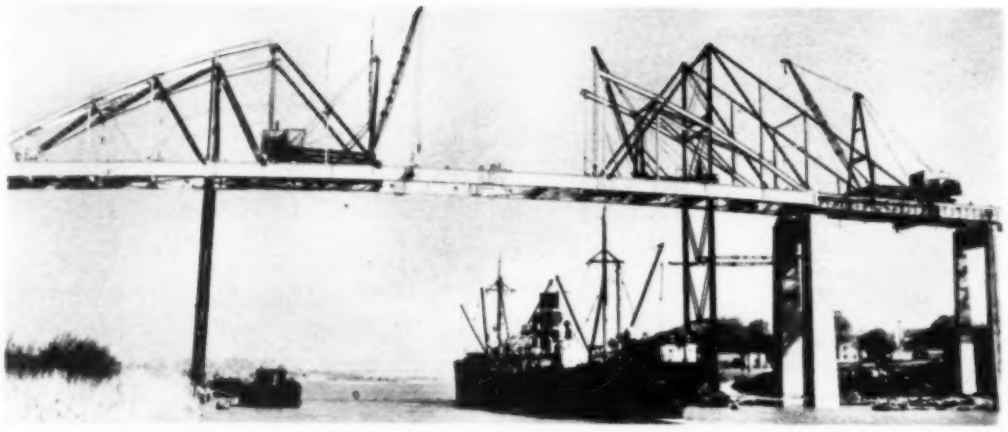
(Continued on page 102)

KENTUCKY DAM. Tennessee Valley Authority structure on Tennessee River at Gilbertsville, in western Kentucky, is largest river development project ever undertaken east of Mississippi River. Dam, 160 ft. high above rock foundation, requires 1,100,000 cu.yd. of concrete and is scheduled for completion in 1944 at cost of $105,000,000. In center of photograph is power-house section to house 5 generators with total capacity of 160,000,000 kw. At right is spillway section of dam.

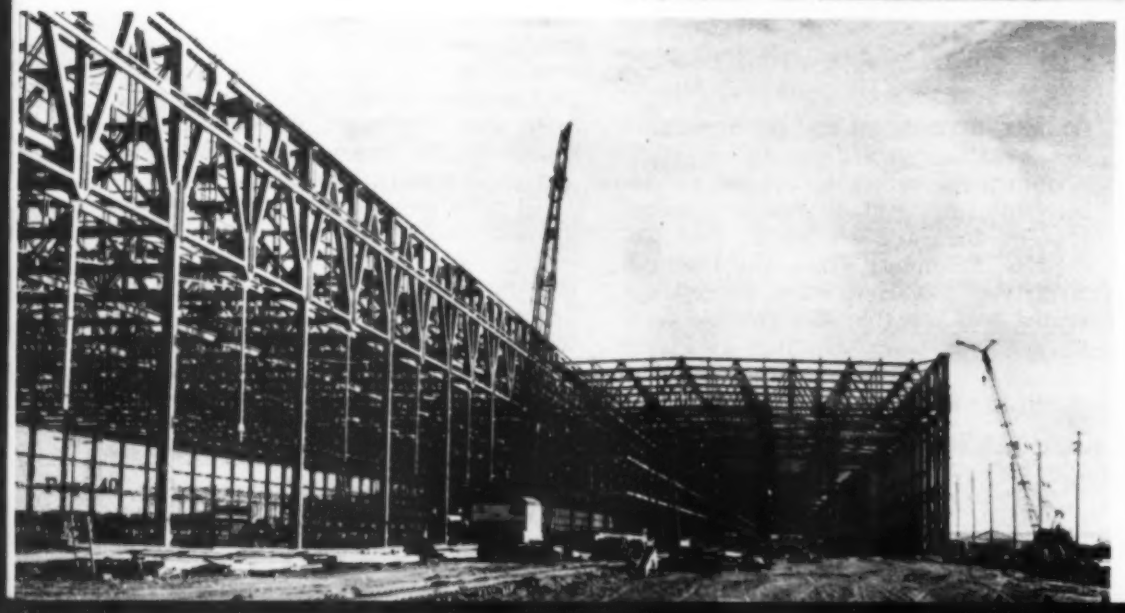
THIS MONTH'S NEWS REEL

IN CANAL ZONE barracks of reinforced concrete frame design are under construction to relieve shortage of housing for Army personnel at military post of Corozol.

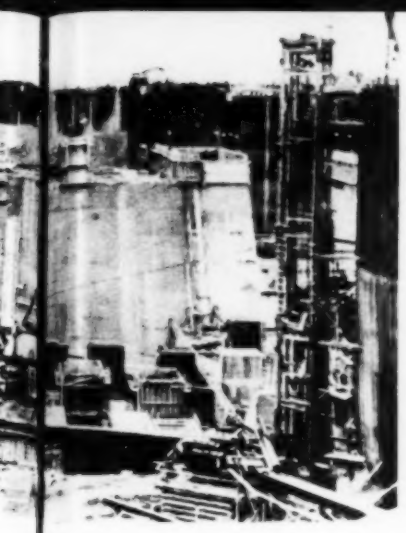
Press Association Photo



HUGE BOMBER ASSEMBLY PLANT (below) with length of 4,000 ft. and main aisle spanned by 200-ft. steel trusses is under construction at Fort Worth, Texas, for Consolidated Aircraft Co., by The Austin Co., engineers and builders, of Cleveland, Ohio, as described in detail elsewhere in this issue.



CLOSURE OF MAIN 540-FT. SPAN is effected Oct. 23 at St. Georges high-level bridge being built under U. S. Engineer Department supervision across Chesapeake and Delaware Canal at St. Georges, Del., forming connecting link, carrying two 23-ft. roadways, with DuPont Highway. Tied arch span providing 135-ft. clearance for shipping, is flanked on each end by 1,800-ft. beam and girder approaches. Steel erection is by Phoenix Bridge Co. Consulting engineers on project are Parsons, Klapp, Brinckerhoff & Douglas.

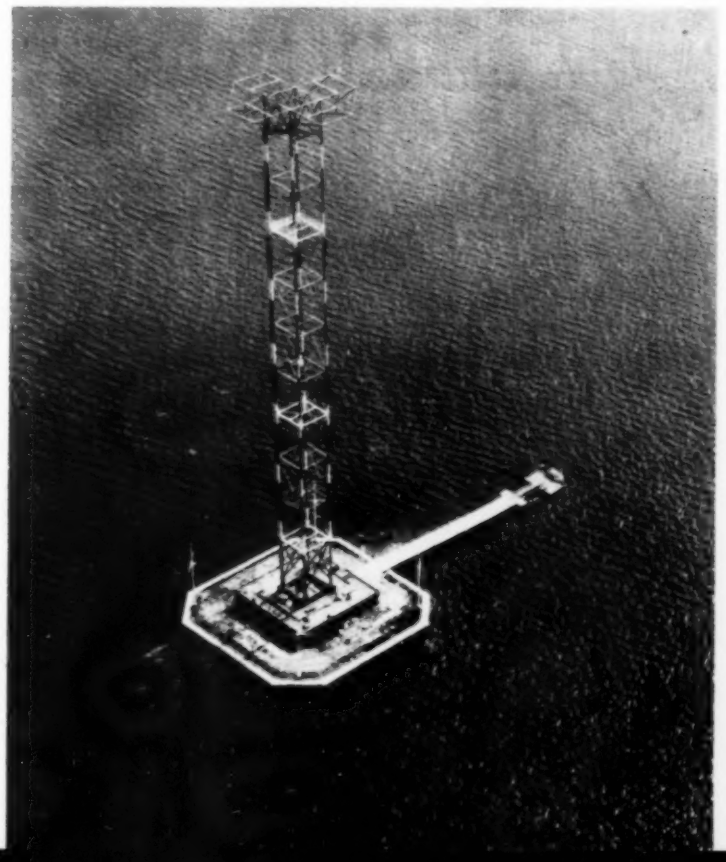


WIDENING OF RUNWAYS at Municipal Airport, Madison, Wis., is accomplished with aid of Barber-Greene tamping-leveling bituminous finisher. On limestone base 2-in. asphaltic mat 150 ft. wide is laid by Payne & Dolan, Wisconsin contractor. Project calls for 10,000 tons of bituminous surface mix.

FOR OUTSTANDING CONTRIBUTION TO STEEL CONSTRUCTION, ROBERT MOSES (third from left), Commissioner, Department of Parks, New York City, receives J. Lloyd Kimbrough medal, awarded for first time by American Institute of Steel Construction at its nineteenth annual convention Oct. 14-17. Officers of Institute present at presentation ceremony are (left to right): V. G. IDEN, secretary; F. H. FRANKLAND, director of engineering; COMMISSIONER MOSES; CLYDE McCORNACK, first vice-president; R. T. BROOKS, executive vice-president and T. R. HIGGINS, chief engineer.

MUNHALL HOMESTEADS, F.H.A. housing project to accommodate steel mill workers just outside of Pittsburgh, Pa., is scene of grading operation by B. A. Jacobson Construction Co., of Pittsburgh. On 240,000-cu.yd. earth-moving job contractor uses three 14-yd. Euclid bottom-dump wagons powered by 150-hp. Cummins diesel engines to receive loads from elevating grader. 47 buildings in project are erected on terraces cut in sides of hills.

ARTIFICIAL ISLAND (below) in Long Island Sound near New Rochelle, N. Y., forms site for new 410-ft. high radio transmitter tower of Columbia Broadcasting Co.



PIT RIVER BRIDGE (below) for carrying both railway and highway traffic on relocated routes at reservoir to be created by Shasta Dam, in California, is supported by concrete piers 360 ft. high.—Photo from California Division of Highways.

Cantilever Steel Bents

On Pipe Pile Foundations Carry Elevated Highway

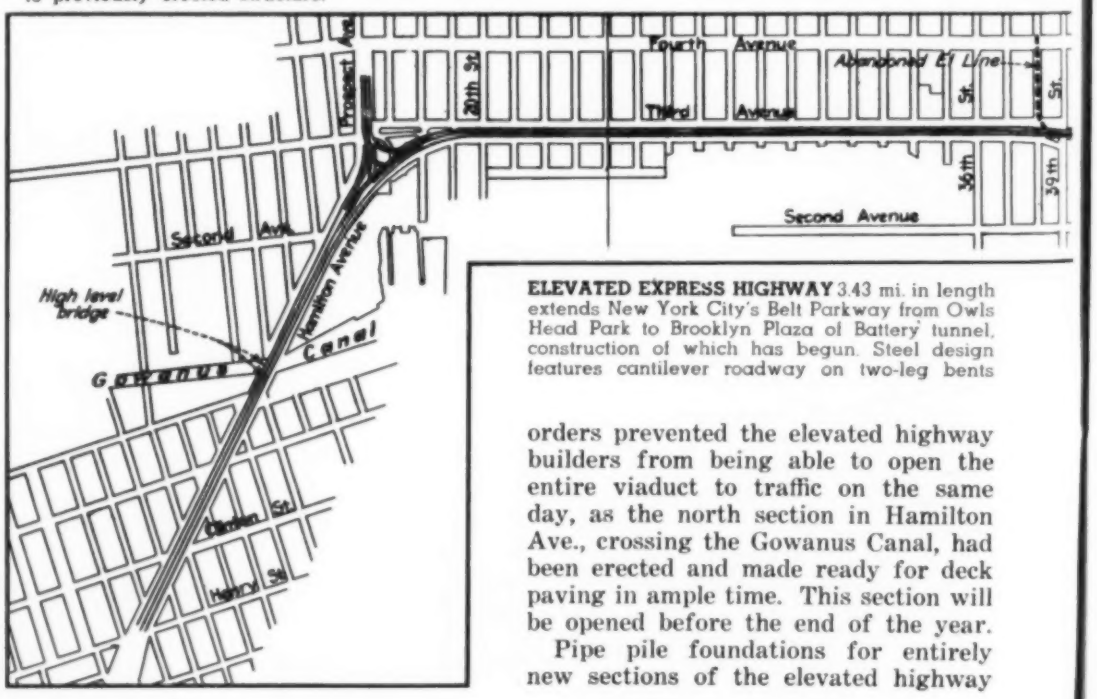
TALL BENTS erected by Harris Structural Steel Co. in Hamilton Ave. carry girder spans rising to high elevation for crossing of Gowanus Canal.

CRAWLER CRANE (below) with 60-ton lifting capacity raises 72-ft. end floor beam weighing 17 tons. Expansion dams are in place on beam for six-lane divided highway. Special trussed bracket holds three parts of floor beam in position to fit over webs of longitudinal girders.

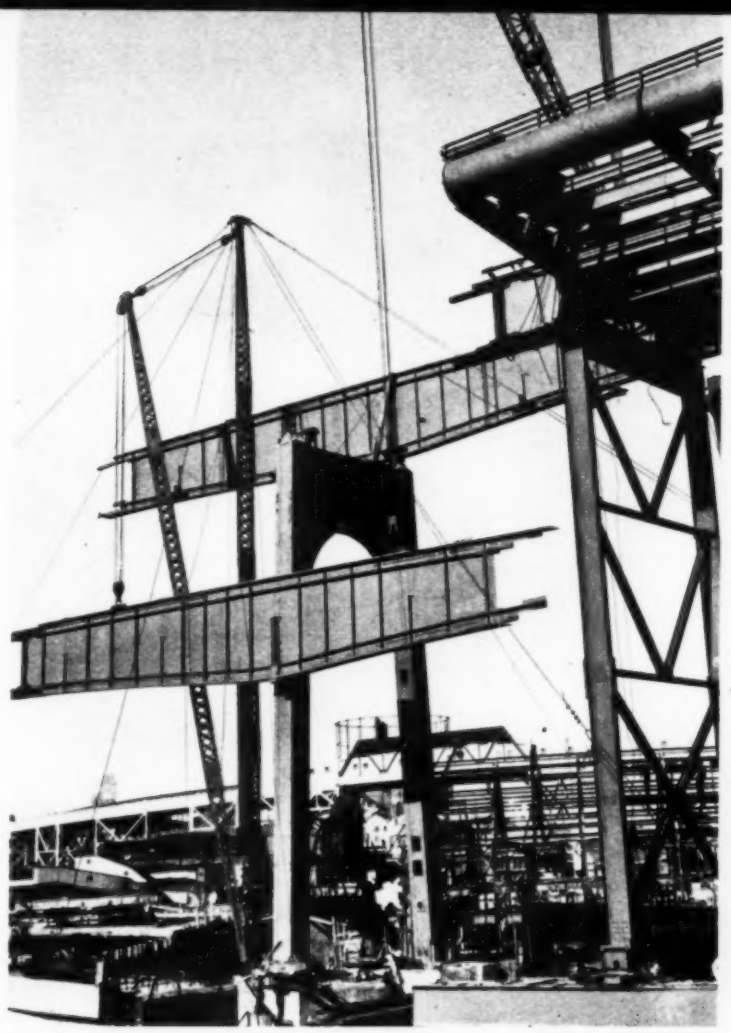
COMPLETE CANTILEVER BENT UNIT in Third Ave. is set by one crawler crane, while second crane places main girder connecting new bent to previously erected structure.

TO EXTEND THE LONG ARC of New York City's Belt Parkway from its present terminus at Owls Head Park to a connection with the Brooklyn plaza of the Battery tunnel, recently placed under construction, the Triborough Bridge Authority at a cost of $15,000,000 for land and structures has built a 3.43-mi. elevated highway notable for its two-leg steel cantilever bents in the new section and for revamping of existing elevated railway structure in a converted section 6,700 ft. long. Fifteen months after taking the first bids for foundations and structural steel in August and September, 1940, the Authority on November 1, 1941, opened to traffic that portion of the highway running north for about 2.7 mi. from Owls Head Park to Prospect Ave. Only a delay in obtaining steel for the Prospect Ave. grade separation from a manufacturer hard pressed by huge defense orders prevented the elevated highway builders from being able to open the entire viaduct to traffic on the same day, as the north section in Hamilton Ave., crossing the Gowanus Canal, had been erected and made ready for deck paving in ample time. This section will be opened before the end of the year.

Pipe pile foundations for entirely new sections of the elevated highway



ELEVATED EXPRESS HIGHWAY 3.43 mi. in length extends New York City's Belt Parkway from Owls Head Park to Brooklyn Plaza of Battery tunnel, construction of which has begun. Steel design features cantilever roadway on two-leg bents



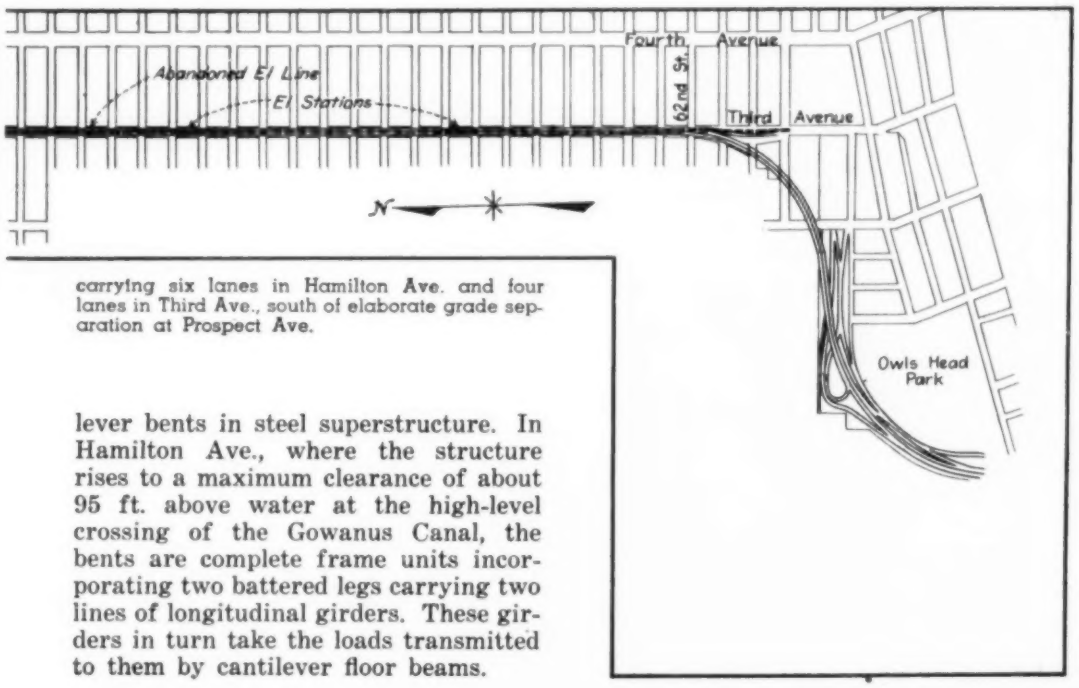
ANCHOR ARM weighing 68 tons, for silicon steel girder of 216-ft. span crossing canal, is erected on tall bent by deck traveler and by guy derrick on ground lifting in unison. Note steel falsework bent under deck derrick.

STEEL FALSEWORK TOWER supporting cantilever arm of 216-ft. canal crossing permits deck traveler to move forward to end of erected structure, where it can pick up its share of 72¼-ton closure section on high boom.

called for a considerable mileage of 16-in. and 18-in. pipe; in a number of places the pipe piles encountered driving conditions that were unexpected and unusual. Two portions of the new elevated highway, one extending from the north abutment to the Prospect Ave. grade separation and the second from the grade separation to 36th St., indicated on the accompanying map, employ an interesting design of cantilever bents in steel superstructure. In Hamilton Ave., where the structure rises to a maximum clearance of about 95 ft. above water at the high-level crossing of the Gowanus Canal, the bents are complete frame units incorporating two battered legs carrying two lines of longitudinal girders. These girders in turn take the loads transmitted to them by cantilever floor beams.

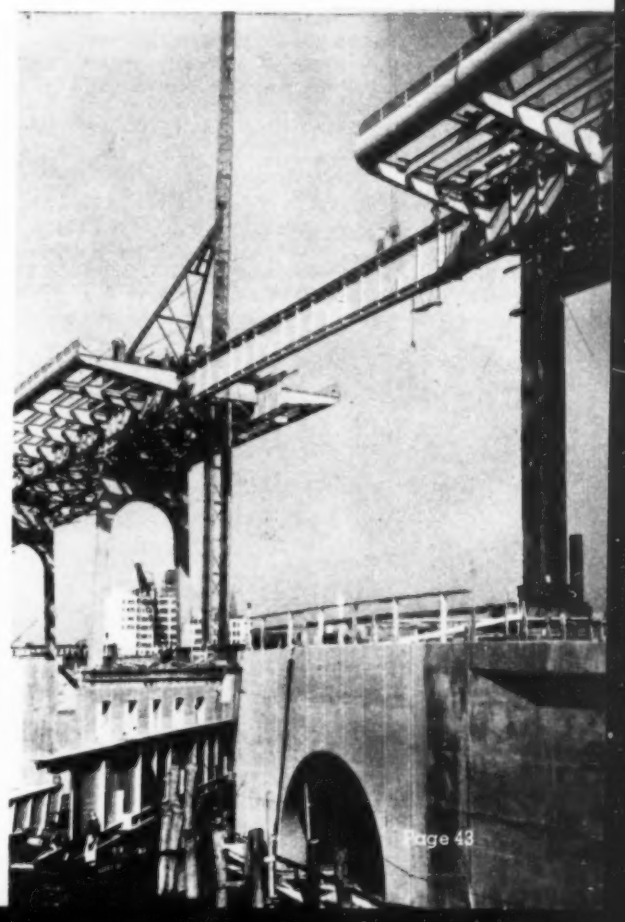
A simpler and more compact design was used for the superstructure of the new elevated highway in Third Ave. from 20th to 36th Sts. In this section the height of the structure is uniformly low, and the width of the roadway provides for only four traffic lanes, in contrast with the six lanes required on the high-level deck in Hamilton Ave. Accompanying drawings indicate some

(Continued on page 46)

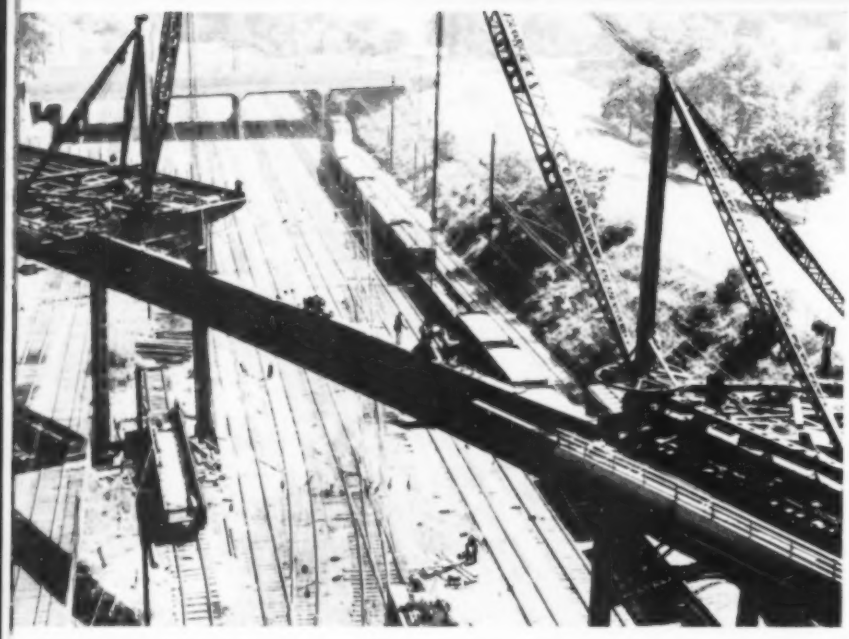


carrying six lanes in Hamilton Ave. and four lanes in Third Ave., south of elaborate grade separation at Prospect Ave.

CLOSURE SECTION (below) weighing 72¼ tons is picked off barge and hoisted to place between cantilever arms of 216-ft. span by two deck travelers on Nov. 4. Center section of second girder remains on barge in canal between new abutments for two low-level bascule bridges, which will carry separate roadways. All metal except stiffeners in long girders of high-level crossing is silicon steel.

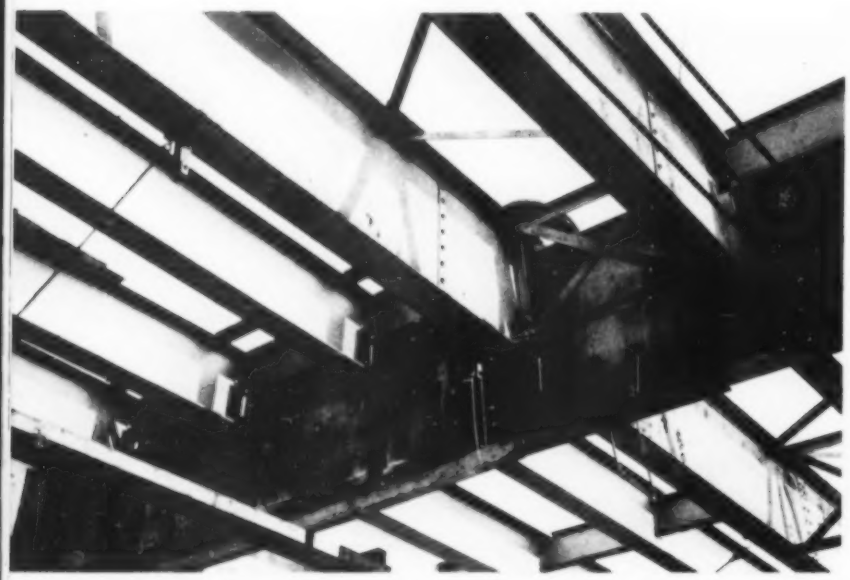


Gowanus Elevated Par



LONG GIRDER measuring 164 ft. between bearings is erected by American Bridge Co. for Corbetta Construction Co., contractor, over depressed yard tracks at south end of Gowanus elevated parkway.

OFF GUARD and against his will, R. B. DILLENBECK (right), resident engineer for Madigan-Hyland, has his picture taken while he talks to THEODORE B. ADAMS, superintendent, B. Turecamo Contracting Co.



NEW STRINGERS are erected on expansion seats, and transverse channels are inserted between stringers to support expansion joint in concrete deck of four-lane highway on remodeled El structure.

TWO CONTRACTS of P. T. Cox Construction Co. are directed by D. A. HUNTLEY (left), president, and GEORGE T. KILEY, (right) engineer, while CHARLES J. LAGRECO (center) represents Madigan-Hyland on low-level bridge, designed for Parks Department by Waddell & Hardesty.

CRANE AND BUCKET (below) place truck-mixed concrete in counterfort wall of Prospect Ave. grade separation for Ross Galvanizing Iron Works, Inc., and Craven Construction Co., contractor. Note slotted metal inserts for stone facing in concrete wall.

TRAVELING STIFF-LEG DERRICK (below) on deck places new floor members in old El structure for P. T. Cox Construction Co.

FASCIA GIRDER SECTION, with shop-fabricated curved fascia plate attached, is erected intact.

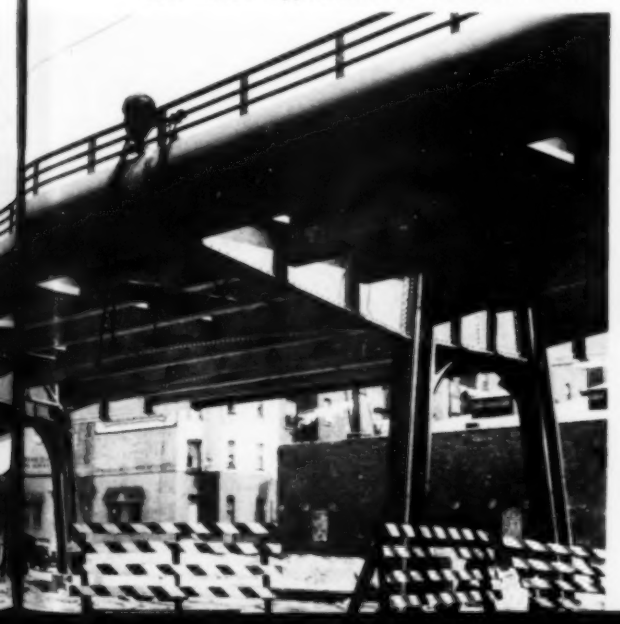
PIPE PILE FOUNDATIONS for Prospect Ave. grade separation are put down to depths of 50 to 140 ft. by B. Turecamo Contracting Co., using three piledriving rigs, one of them equipped with 100-ft. leads. Structures erected on pile foundations at this intersection by Ross Galvanizing Iron Works, Inc., and Craven Construction Co., contractor, include stone-faced walls and stepped abutments, one of which appears in left center, with waterproofing applied to back. In distance, elevated steel highway structure rises toward crossing of Gowanus Canal.
H. A. Wurgel Photo

TWO-COLUMN BENTS with cantilever wings support floor framing for four-lane divided highway on widened section of Third Ave., 20th to 36th Sts., where Harris Structural Steel Co. erects viaduct structure.

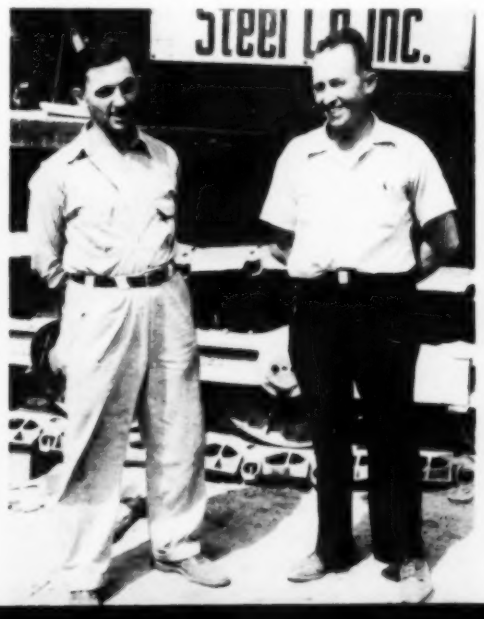
WORKING TOGETHER on reconstruction of old El from 36th to 62nd Sts. are J. S. BERGER, JR. (center), section engineer for Madigan-Hyland, LOUIS FITZPATRICK (right), superintendent, and ARTHUR MATSON (left), foreman, Mt. Vernon Bridge Co., subcontractor on steel for P. T. Cox Construction Co.

CLUSTER OF PIPE PILES to support one leg of tall bent at Gowanus Canal is installed for B. Turecamo Contracting Co. by P. T. Cox Construction Co., contractor at this site on Hamilton Ave. low-level bridge for City Department of Parks.

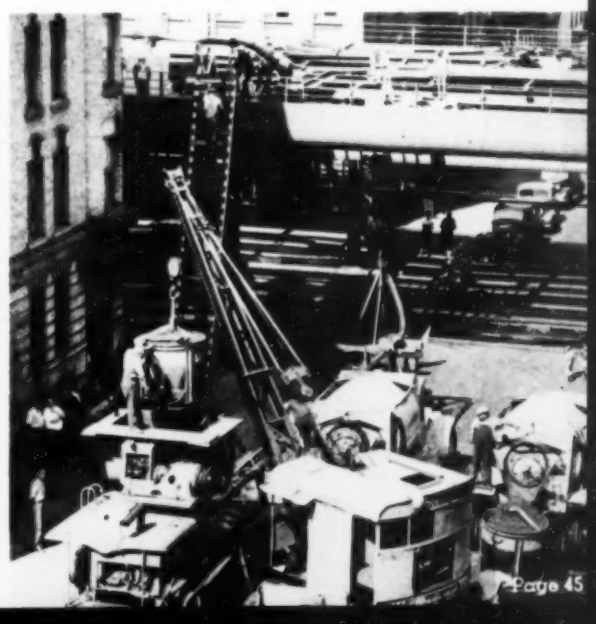
CURVED COVER PLATES (below) on fascia girder are welded at joint. Two-leg cantilever bents and molded fascia combine to give streamlined appearance to elevated structure.

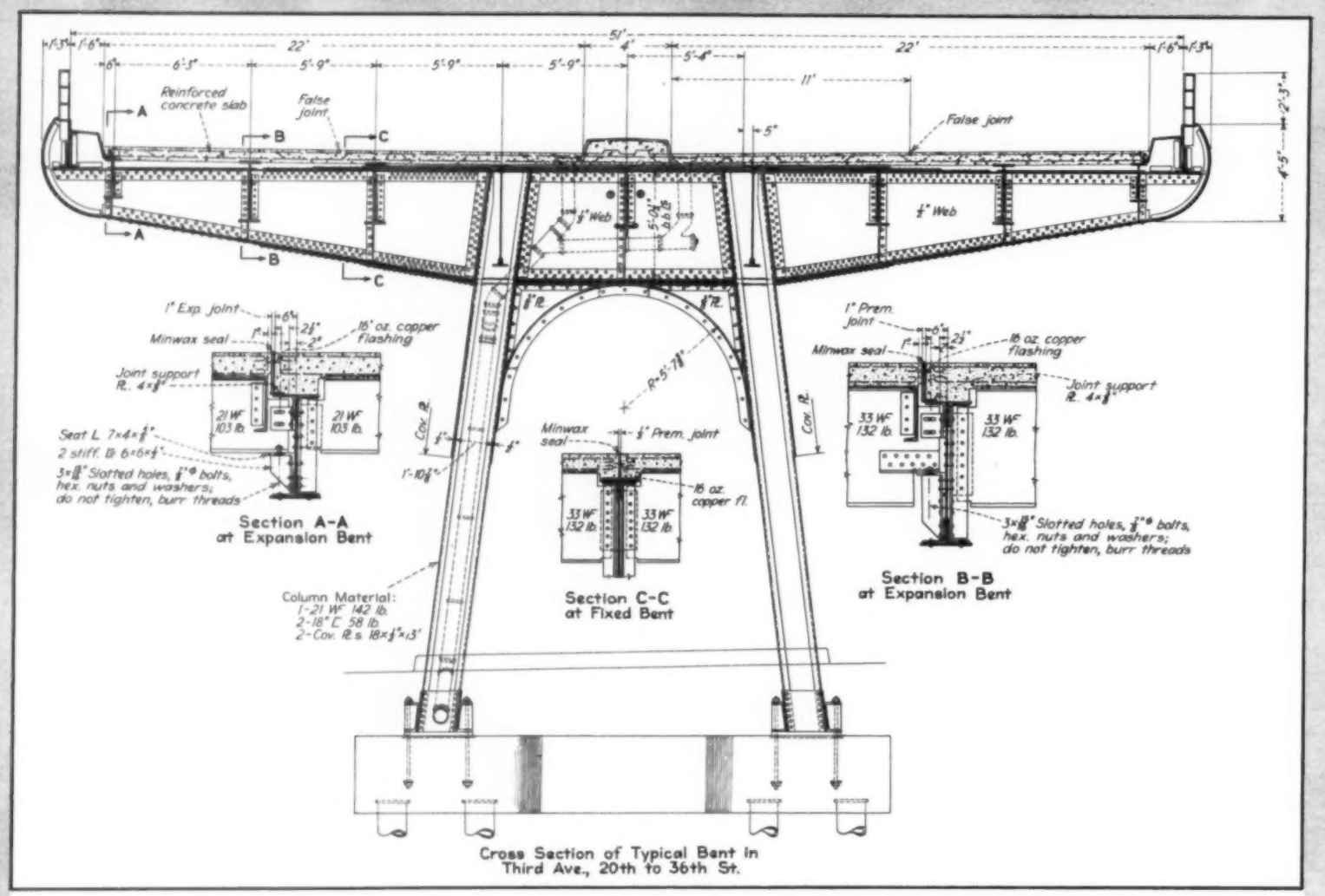


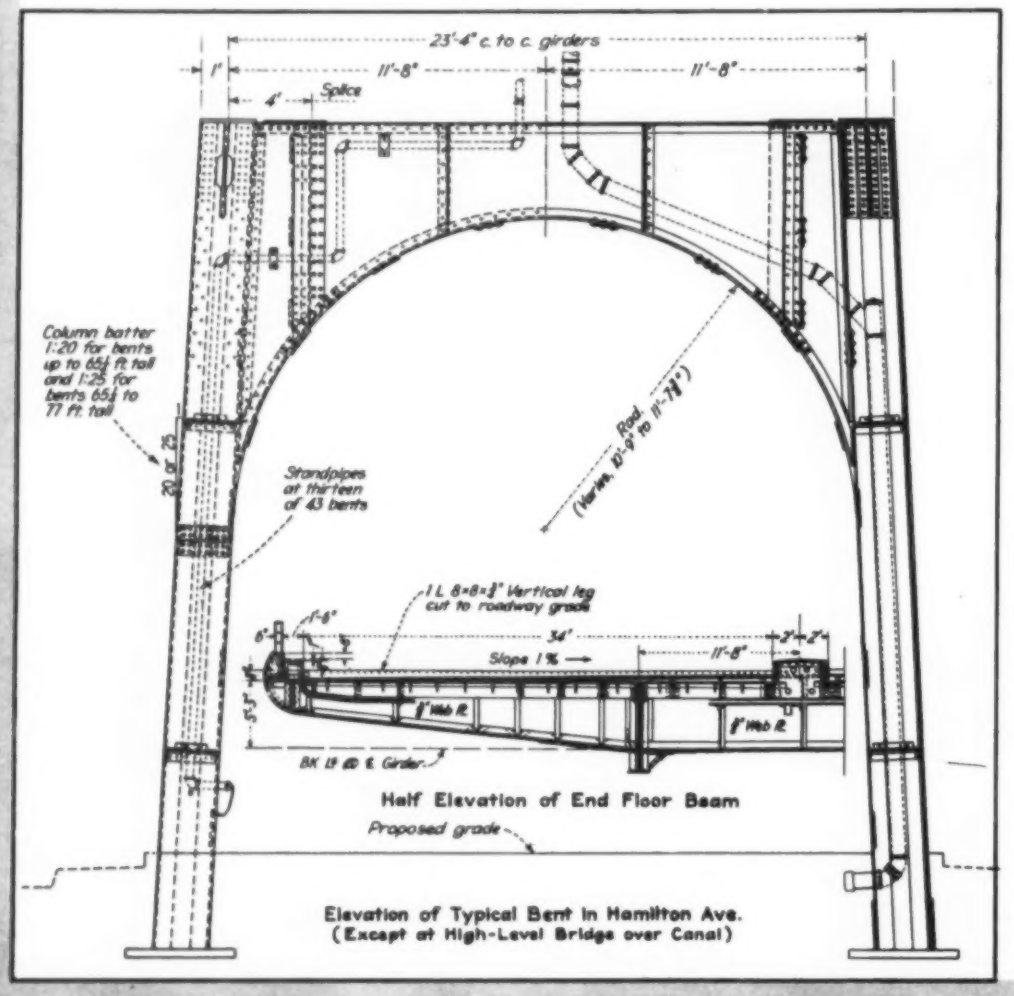
STEEL ERECTION (below) in Hamilton Ave. is supervised by H. A. STETLER (right), superintendent, Harris Structural Steel Co., and J. BRUSCHI, section engineer Madigan-Hyland.



CONCRETE PUMP (below) feeding mixed concrete through pipe line to deck paving crew of P. T. Cox Construction Co. is supplied by truck mixers which do mixing after arrival.







TWO-LEG CANTILEVER BENTS in Third Ave., 20th to 36th Sts., are fabricated in one piece for erection on pipe-pile piers by crawler cranes. Steel floor framing and reinforced-concrete deck for divided four-lane highway have expansion joints at every third bent.

(Continued from page 43)

features of the cantilever bent design in Hamilton Ave. and in Third Ave.

Along both these sections of new steel construction, the city acquired property to provide greatly widened right-of-way for the Gowanus elevated parkway, as the viaduct is named. Inclined legs of the cantilever bents rise from a landscaped mall in the center of the right-of-way, with a 50-ft. one-way traffic street at ground level at each side.

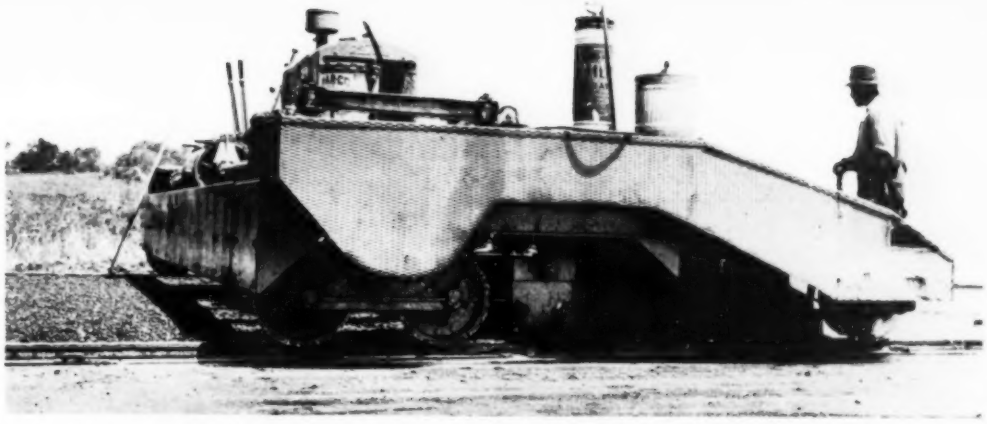
In the section running through Third Ave. from 36th to 62nd Sts., several factors contributed to a decision by the Triborough Bridge Authority to adopt an altogether different elevated highway design utilizing the existing structure of an abandoned elevated railway. The location of the elevated railway is indicated by a heavy broken line on the accompanying map. High property

(Continued on page 87)

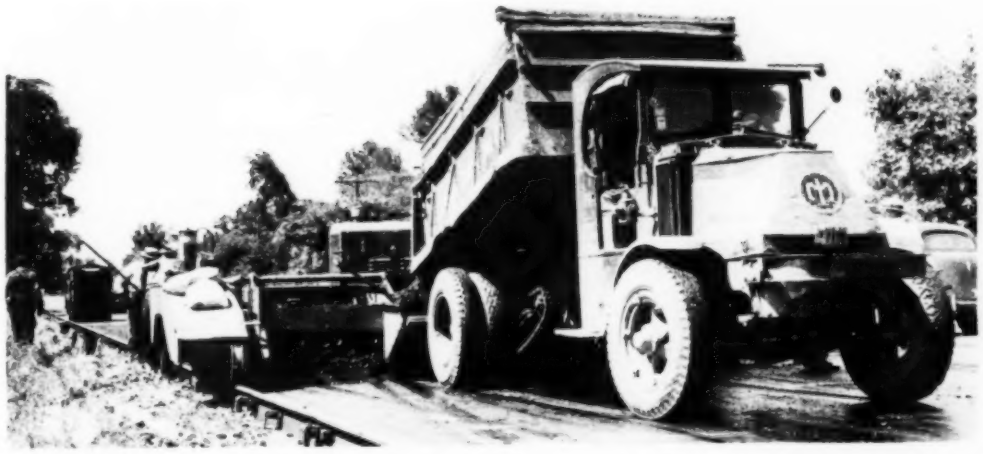
TALL BENTS (left) for elevated six-lane divided highway in Hamilton Ave., crossing Gowanus Canal, are fabricated in separate sections for erection and connection in field. Each floor beam is built as complete unit in shop at New Market, N. J., and is erected by means of specially designed truss bracket which holds three parts in position to fit slots between parts over webs of longitudinal girders.

2-in-1 Machine

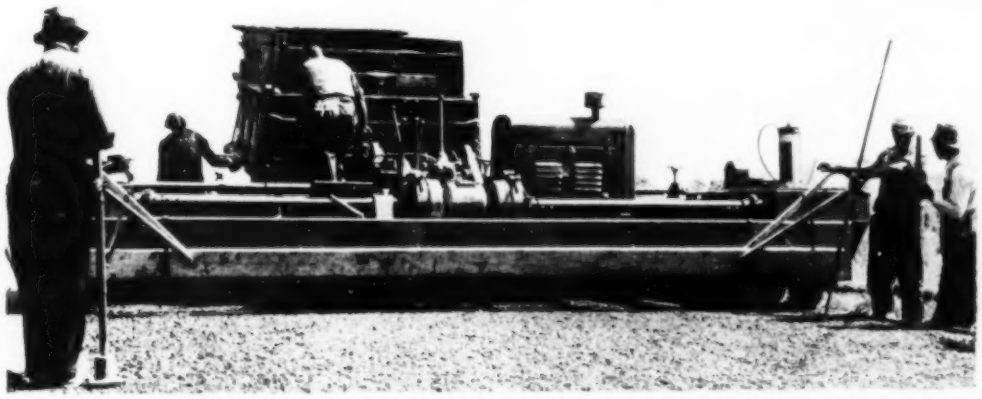
Spreads and Finishes Bituminous Surfacing



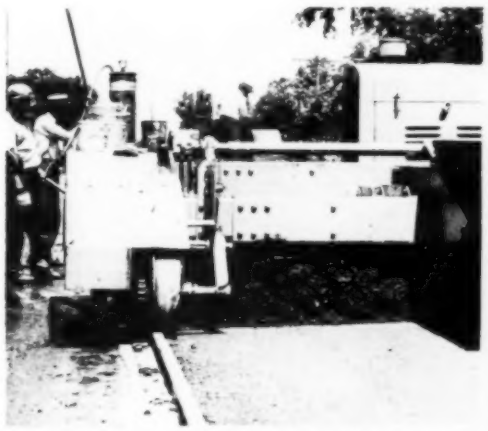
SPREADING AND FINISHING OPERATIONS are combined in single machine equipped with hopper, distributing screw conveyors and reciprocating screed.



DUAL PURPOSE MACHINE fed by motor truck spreads and finishes hot mix of 1½-in. compacted thickness for binder course.



REAR VIEW OF MACHINE showing binder course spread and finished on second half of roadway by reciprocating screed.



TOP COURSE in first 20-ft. half of 40-ft. pavement width is placed and finished in one pass of machine. Inner wheels (illustrated herewith) ride on 3-in. form set on center line of old concrete slab; outer wheels ride on 9-in. concrete road form set along face of slab.

ON SECOND LANE of half-width resurfacing, inner wheels of spreader-finisher machine have flat, instead of double-flanged, tread and ride on ½x6-in. steel strips 10 ft. long, laid along finished inner edge of previously paved lane.

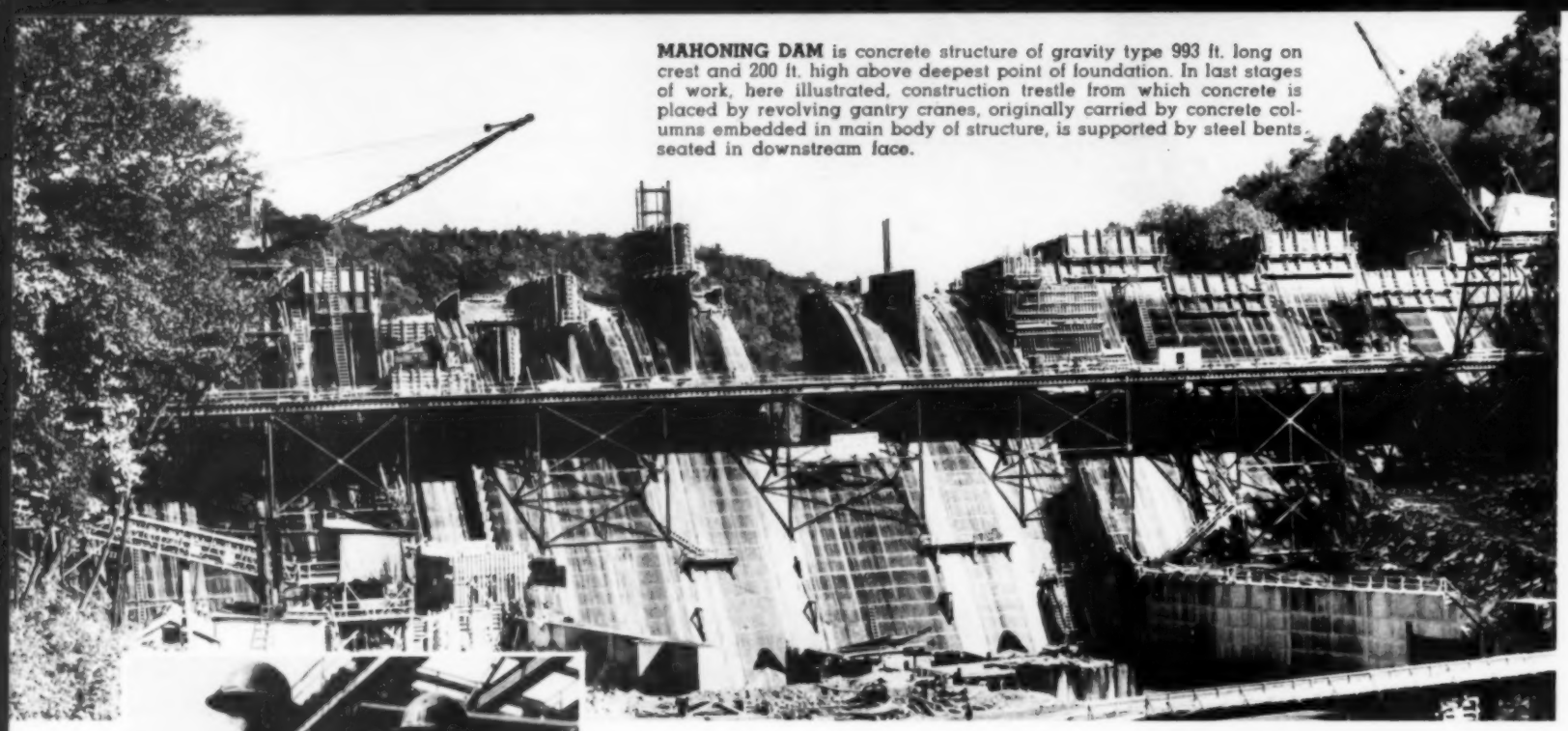
A COMBINATION SPREADER-FINISHER of new design, developed particularly for the application of bituminous surfacing to roads, was used effectively by the Barber Construction Co., of Chicago, in resurfacing in 20-ft. lanes the existing 40-ft.-wide concrete highway west of Park Ridge, Ill.

As designed by the Jaeger Machine Co., of Columbus, Ohio, the new 2-in-1 machine is fundamentally an assembly of standard parts, including a spreader of the screw type to which has been added a hopper in front and a reciprocating screed behind the distributing screws. The machine is adapted especially to spreading and finishing with a single unit bituminous surfacing which requires only one pass with the machine, rather than concrete paving usually requiring more than one pass. Upon the existing concrete as a base was placed new surfacing consisting of a 1½-in. thick binder course and a 1½-in. top course of modified sheet asphalt. In preparation for resurfacing the road, there was set to proper grade along the edge of the existing concrete slab a 9-in. concrete form, with its top 3 in. above the old concrete pavement surface. Along the center line of the 40-ft. roadway, to be repaved in halves, was placed a 3-in. asphalt form brought to accurate grade by shims or shingles and held in place by one pin per section of form driven into a hole drilled in the concrete. On these forms for the first half of the roadway rode the 2-in-1 machine for spreading and surfacing the asphalt mix.

The binder carried mineral aggregate graded up to 1-in. stone and the surface course was composed of the following mix per ton: 1,043 lb. of stone ½ in. to No. 4 size; 228 lb. screenings, No. 4—No. 10 size; 428 lb. sand, No. 10 to 100-mesh; 156 lb. dust; 145 lb. asphalt cement, 60-70 penetration. These materials were heated to 300 deg. F.

Paving procedure consisted in laying the binder one day and following with the top surface the next day, continuing down one side of the road for ap-

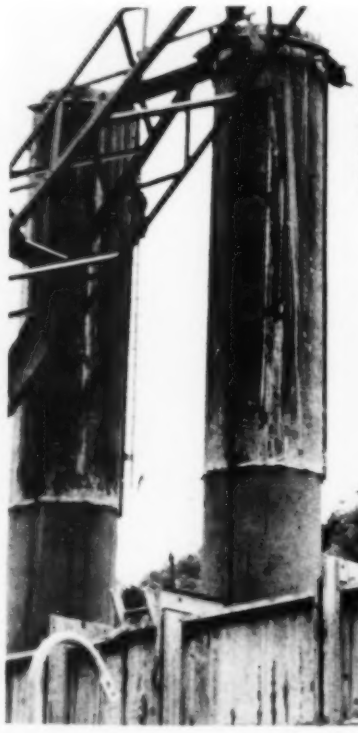
(Continued on page 100)



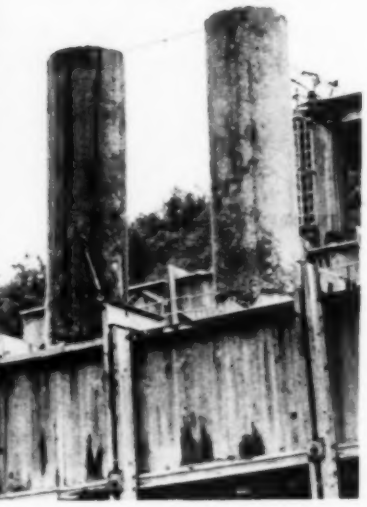
MAHONING DAM is concrete structure of gravity type 993 ft. long on crest and 200 ft. high above deepest point of foundation. In last stages of work, here illustrated, construction trestle from which concrete is placed by revolving gantry cranes, originally carried by concrete columns embedded in main body of structure, is supported by steel bents seated in downstream face.

CONSTRUCTION PERSONNEL on Mahoning Dam includes (left to right): D. P. CHILDRESS, superintendent for Dravo Corp., contractor; JAMES I. BOWMAN, resident engineer for U. S. Engineers; DR. VERNOCY, job doctor.

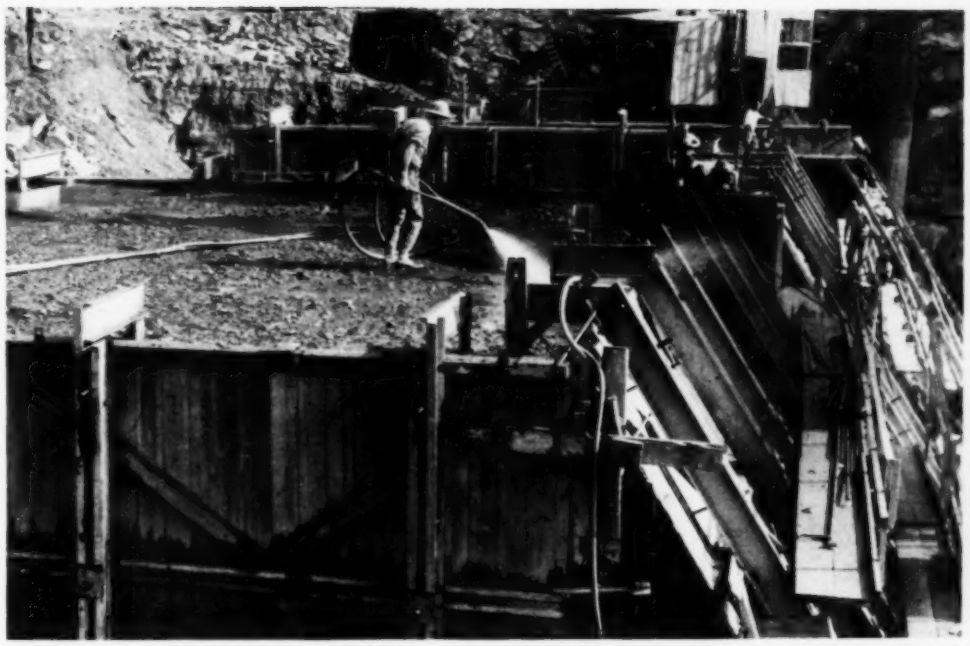
CONSTRUCTION TRESTLE FOR *Mahoning Dam* CARRIED BY MASSIVE CONCRETE COLUMNS



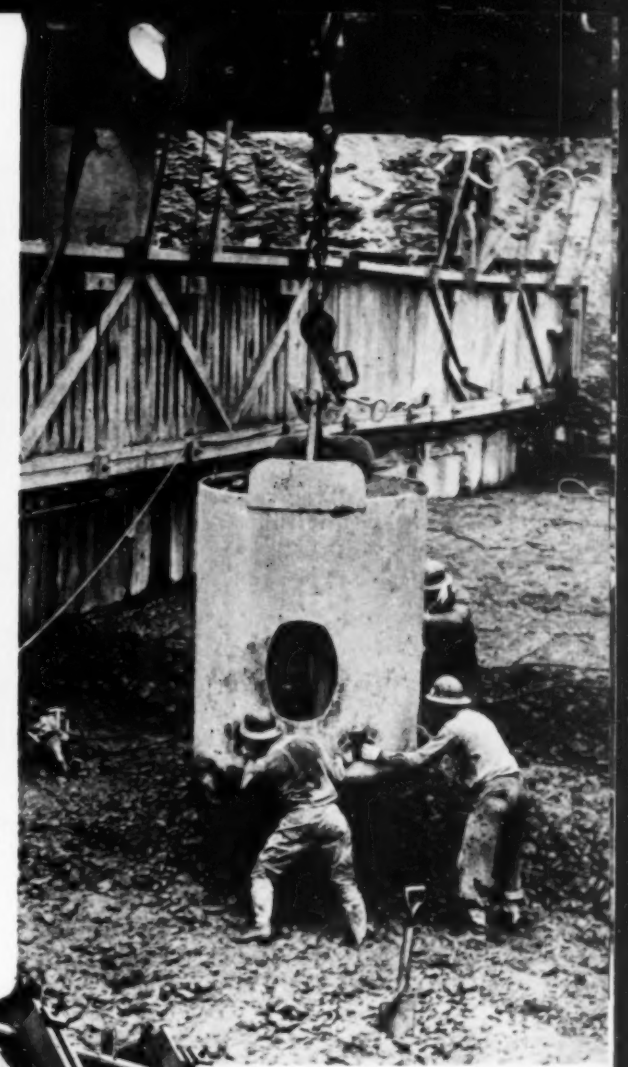
MASSIVE CONCRETE COLUMNS, 6 ft. in diameter, are cast within steel forms to support, without lateral bracing, construction trestle extending length of dam. Columns are permanently buried in structure as mass concrete rises.



CONSTRUCTION TRESTLE (left) carrying cranes for placing concrete is supported by circular concrete columns, 6 ft. in diameter, which are embedded in structure as pouring progresses. Along downstream face is track on which dinkey-hauled trains deliver concrete in 2-cu.yd. buckets for pick-up by cranes.



CLEANING AND REMOVAL OF LAITANCE from surface of each lift before next pour of concrete are done with air and water jet. Note forms being placed for next pour of concrete.

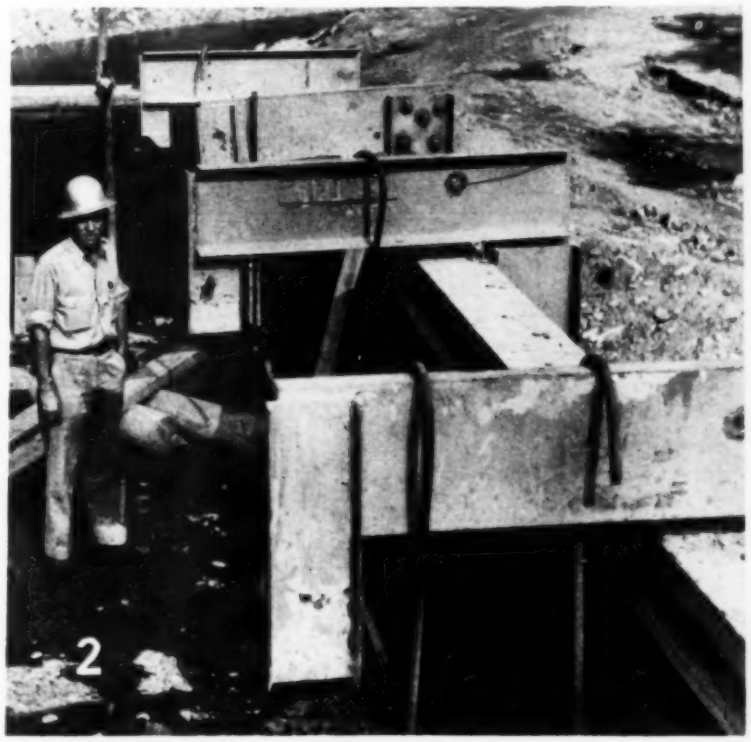


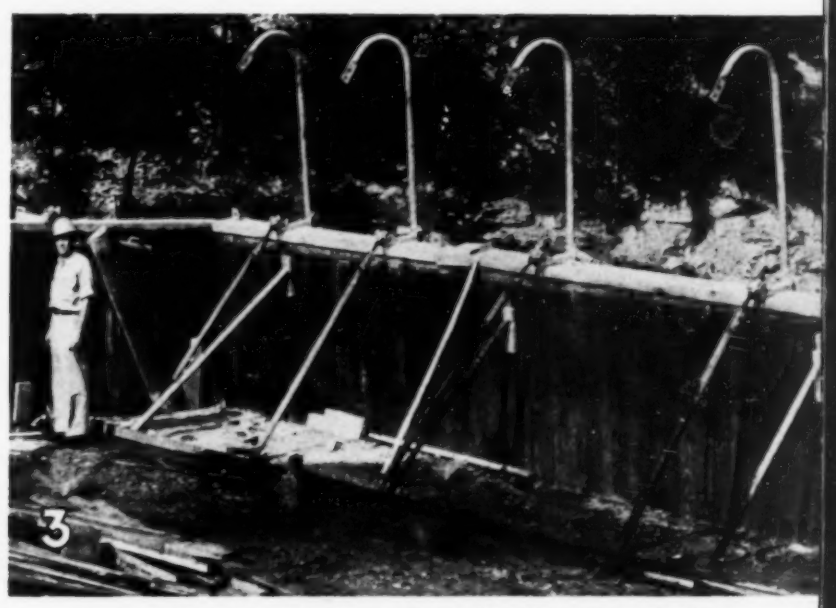
IN 2-CU.YD. BUCKETS (right) concrete is delivered by cranes on construction trestle and vibrated immediately after being discharged.

COMPLETED ONE YEAR AHEAD OF SCHEDULE by the Dravo Corp., of Pittsburg, Mahoning Dam, located on Mahoning Creek 22 mi. above its junction with the Allegheny River, and about 50 mi. northeast of Pittsburgh, Pa., in one of a number of flood-retention structures being built by contract under the direction of the U. S. Engineer Department for the protection from flood damage of Pittsburgh, and other localities in the Allegheny and Monongahela watersheds.

The dam is of the straight, concrete, gravity type, 993 ft. long at its crest and about 200 ft. high above the deepest point of its foundation. Contract for the structure, let in January 1939, to the Dravo Corp. for $2,646,610, involved 250,000 cu.yd. of evcavation and 346,000 cu.yd. of concrete. Atop the spillway section in the middle of the dam are five vertical-lift crest gates operated by two traveling gantry cranes;

(Continued on page 104)



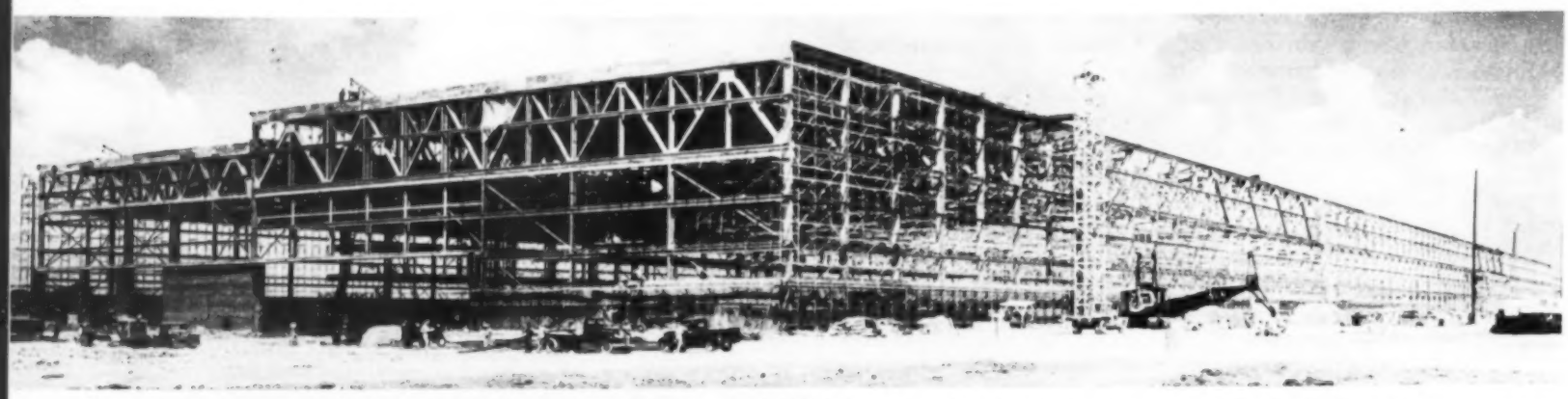


Figs. 1, 2 and 3 . . . DETAILS OF FORMS for concreting Mahoning Dam. Most forms are of cantilever type but some of so-called Hiwassee type also were used.

Blackout Bomber Plants

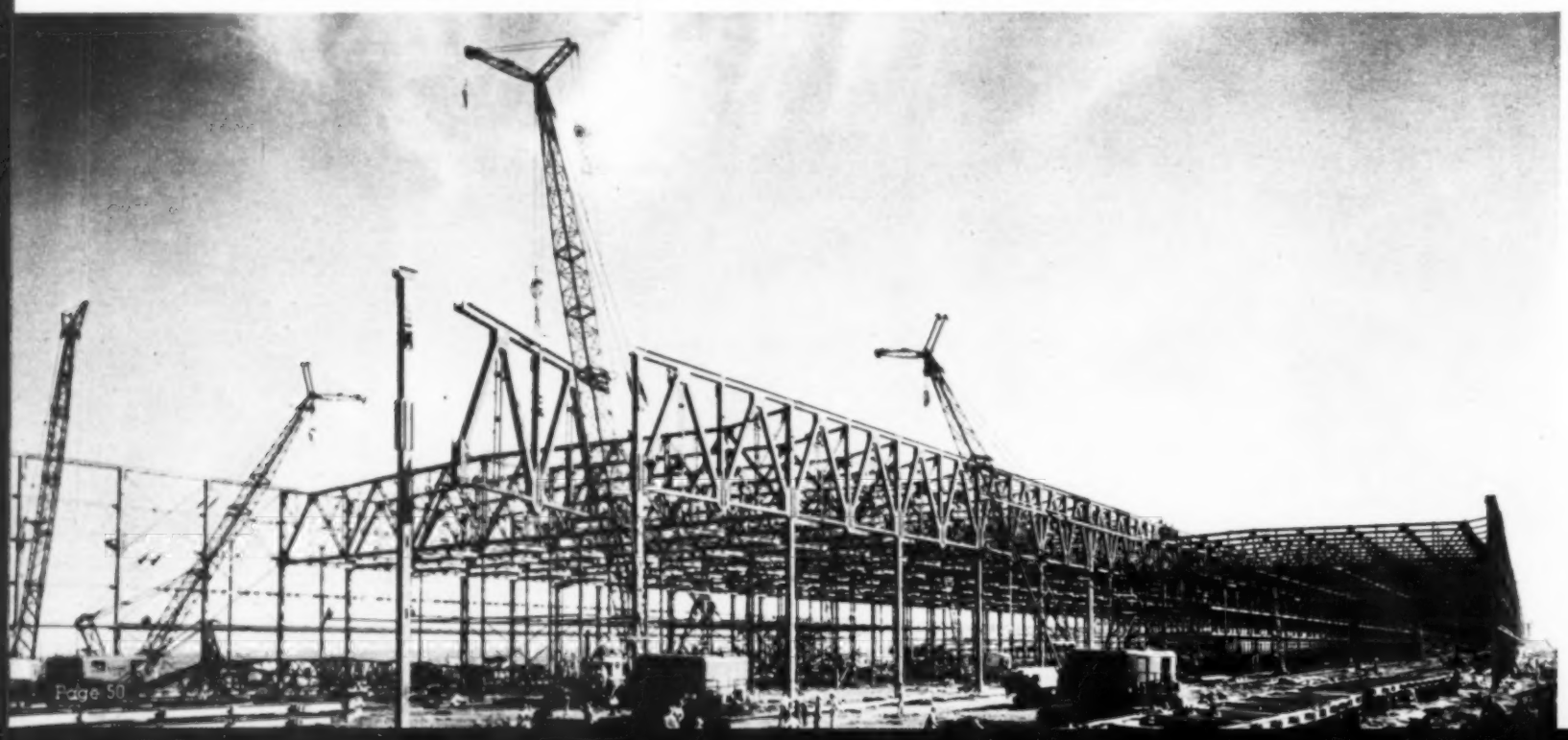
Are Windowless Structures 4,000 Ft. Long With Steel Panel Walls and Roofs Insulated With Glass Fiber

WINDOWLESS WALLS of prefabricated steel panels insulated with glass fiber inclose 4,000 ft.-long air-conditioned assembly building. Masonry walls with special reinforcing extend around base of building to height of 12 ft.



27,000 TONS OF STRUCTURAL STEEL are required for framework of 4,000-ft.-long assembly shop for bomber plant at Fort Worth, Tex. Main aisle trusses, each weighing 40 tons, have span of 200 ft. and depth of 25 ft.

STEEL ERECTION (below) for 4,000-ft.-long structure is handled by long-boom crawler cranes. Here 50-ft. jack truss is being placed on line of columns separating 200-ft. main assembly aisle on left from 120-ft. auxiliary aisle on right. In right foreground 120-ft. trusses are being assembled.



WALL BASES for height of 12 ft. are of masonry construction 13 in. thick. Hollow acoustic block, backed up with 1-in. Fiberglas insulating board, is faced with common brick and an exterior surface of sand-finished face brick. Wall is reinforced at every fourth course with trussed rods to make it shatterproof.

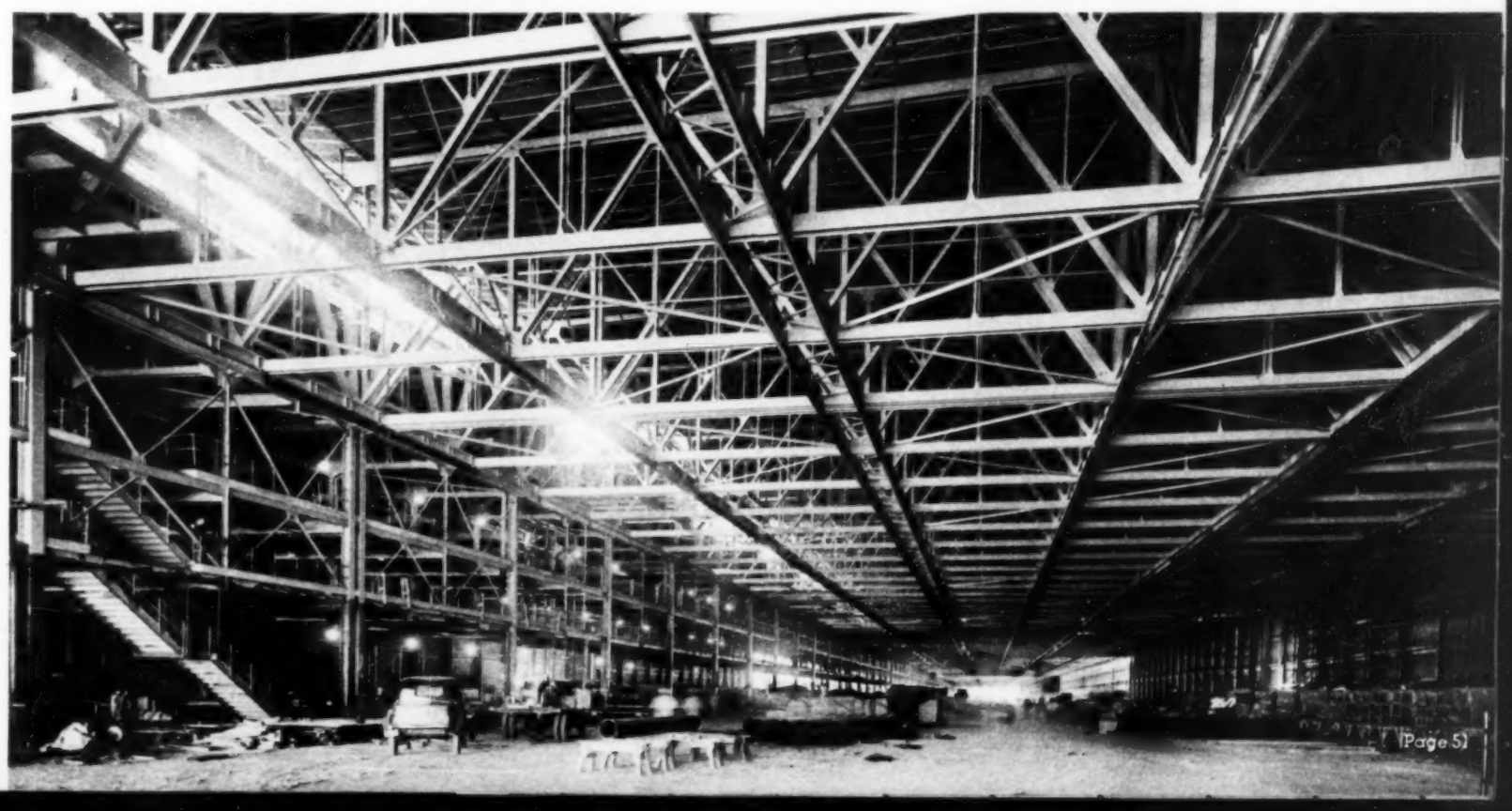
TEMPORARY SUPPORTS expedite erection of 200-ft. main aisle, 25 ft. deep. Falsework at extreme right carries 200-ft. jack truss which has been entirely assembled above ground.

A NEW TYPE of shatter-proof, non-combustible side-wall and roof construction combining three types of glass fiber and prefabricated steel panels is being used to insure insulation and acoustical control for working efficiency in the twin 4,000-ft. long Army bomber assembly plants being erected at Fort Worth, Tex., and Tulsa, Okla. Engineers of The Austin Co., who designed both plants, evolved the combination which utilizes products developed by Truscon Steel Co. and Owens-Corning Fiberglas Corp. in a new approach to the task of insulating vast factory areas for economical year-round air-conditioning.

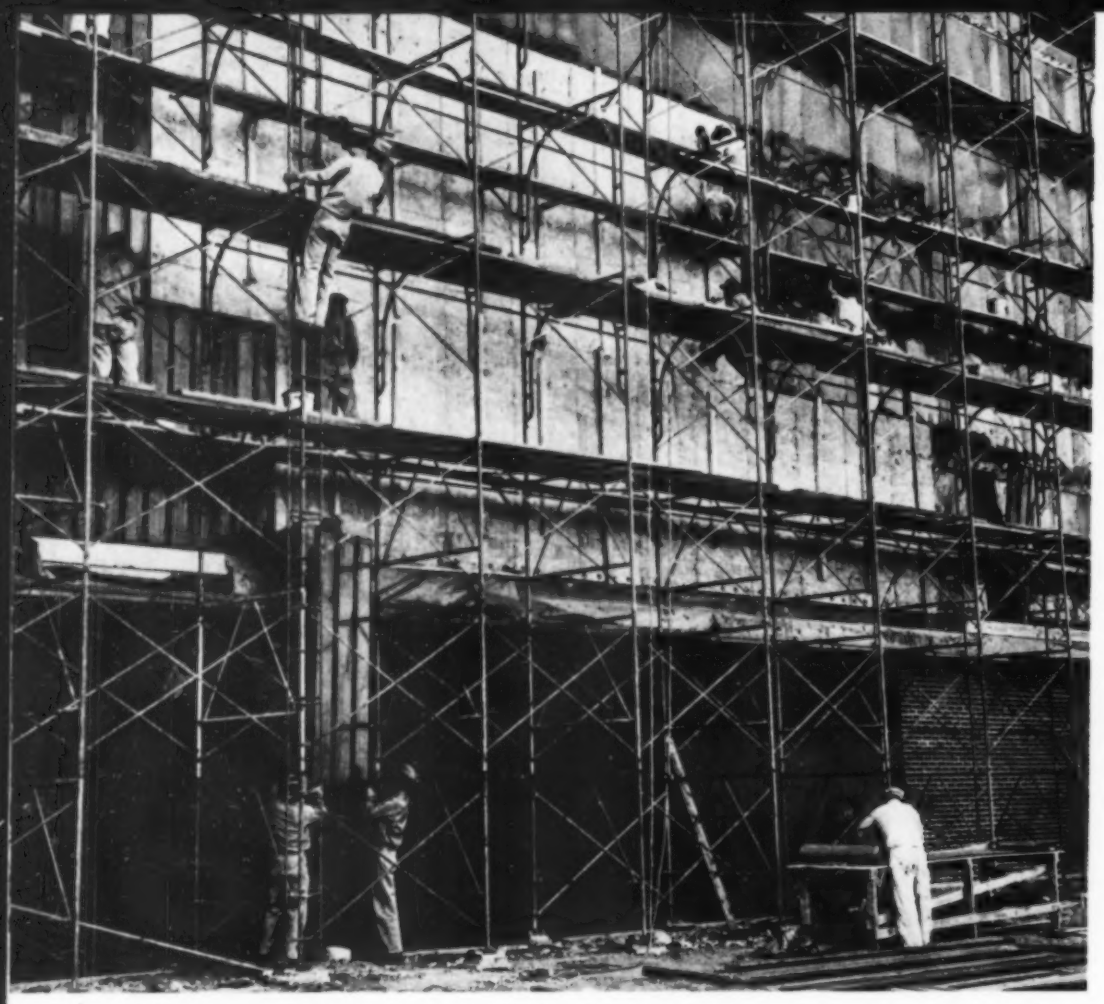
With a total of 406 carloads of Fiberglas required for these jobs—203 carloads for each plant—they will probably contain more glass in their windowless steel side walls and roof than in the largest daylight factories ever built. By blanketing all interiors with several layers of these materials, which are designed to eliminate or control all condensation and to reduce heat transference to a practical minimum, the cooling load has been substantially reduced.

These facts, and other features designed to insure year-round working comfort, economical operation and production efficiency in the two plants, where a total of 30,000 men will be soon

HUGE, UNOBSTRUCTED FLOOR AREA (below), covering 2,000,000 sq. ft., is provided in main aisle of assembly building by 200-ft. trusses, beneath which are 32,000,000 cu. ft. of working space without single column. Floors are surfaced with white cement for maximum light reflection.



(Page 5)



SHATTERPROOF WALLS, 65 ft. high, are of prefabricated cellular steel panels insulated with Fiberglas board. Steel-tube scaffolding provides platforms for workers and materials for wall construction.

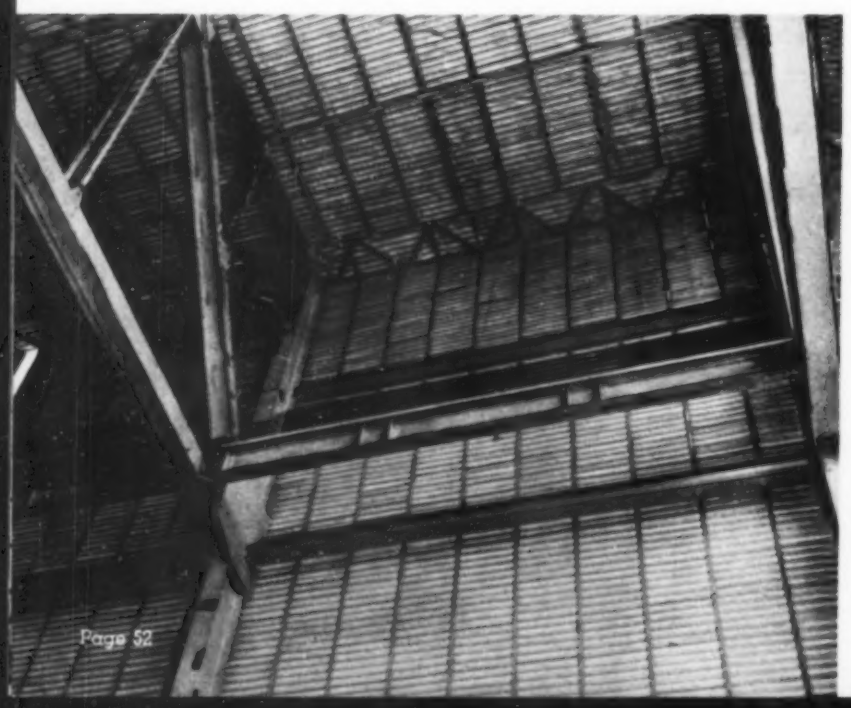
ROOFING OF ASSEMBLY PLANT consists of cellular steel panels covered with vapor seal of hot asphalt and paper on which are placed 1 ft. 4-in.x4-ft. glass fiber insulating boards. Next

assembling four-engined bombers on moving assembly lines, were disclosed when the Austin organization started erection of side walls for the Fort Worth plant in September. Alternate layers of Fiberglas and special vapor seal paper, held together with asphalt, are being combined with steel channels, roofing sections and metal lath to give the walls and roofs of all buildings maximum strength and the highest obtainable acoustical, insulating and light-reflecting qualities.

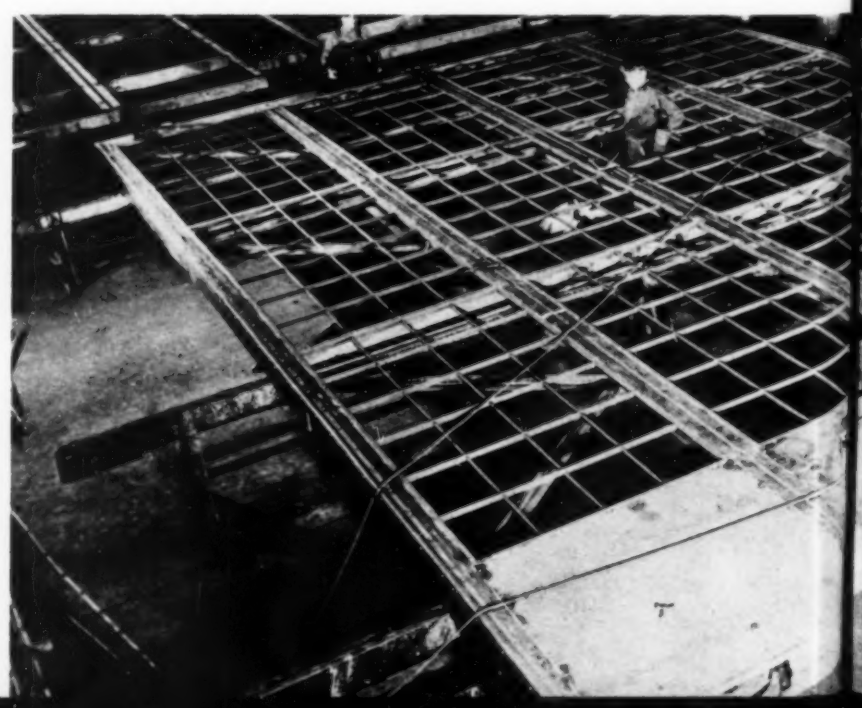
Both plants are being built for the War Department under direction of the Corps of Engineers, U. S. Army, which has a staff of 30 engineers and 238 inspectors, auditors and clerks on the job at Fort Worth. The Austin Co. has its own staff of 102 engineers and 20 clerks at work on plans, specifications and the detailing of mechanical equipment and production layouts for the two plants in a downtown office building there, where Consolidated Aircraft Co., which will operate the Fort Worth plant, has its own consulting engineer. They all work seven days and three evenings a week, or a total of 65 hr.

Another group of 147 Austin engineers, superintendents, auditors, purchasing agents and clerks are located in field offices on the 1,450-acre bomber plant site overlooking Lake Worth, where 3,500 construction workers are building the plant on a two-shift schedule that runs from 5 a.m. to midnight, seven days a week. With work in full swing this crew will reach 6,000.

INTERIOR WALL SURFACES (below) of assembly plant are lined with white Fiberglas, held in place by expanded metal lath, producing venetian blind pattern designed for light-reflecting qualities.



ONE LEAF OF HANGAR DOOR (below), which is of steel vertical-lift type, is assembled at site. Doors 200 ft. wide are installed in 100-ft.-wide units. There are also single-unit doors 150 ft. wide.



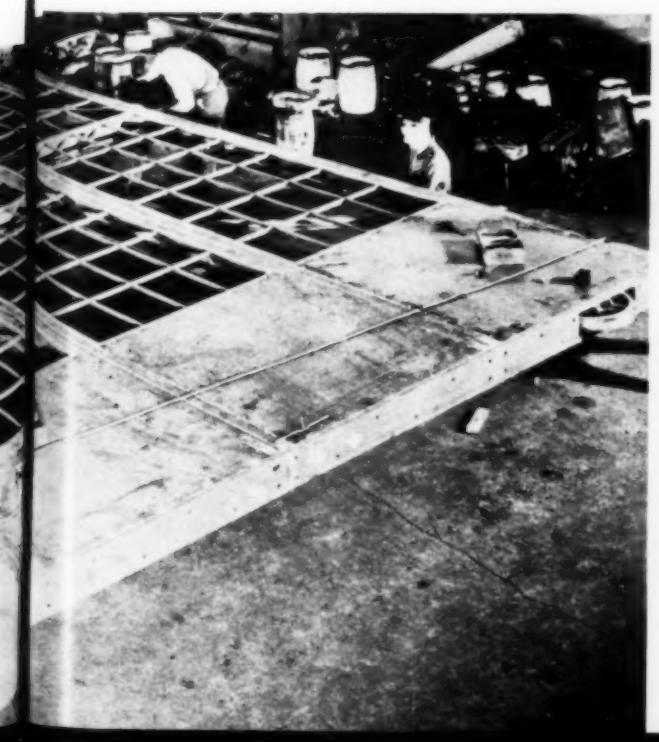
comes waterproofing of 4-ply rag felt laid in tar surfaced with washed gravel. Finished roof deck, including purlins, 12-in. channels and suspended ceiling weighs 13.3 lb. per sq.ft.

ROOF DECK is of cellular steel Ferroboard anchored to steel purlins. Workers are installing runner channels to support suspended acoustical ceiling of expanded metal lath and glass wool insulation.

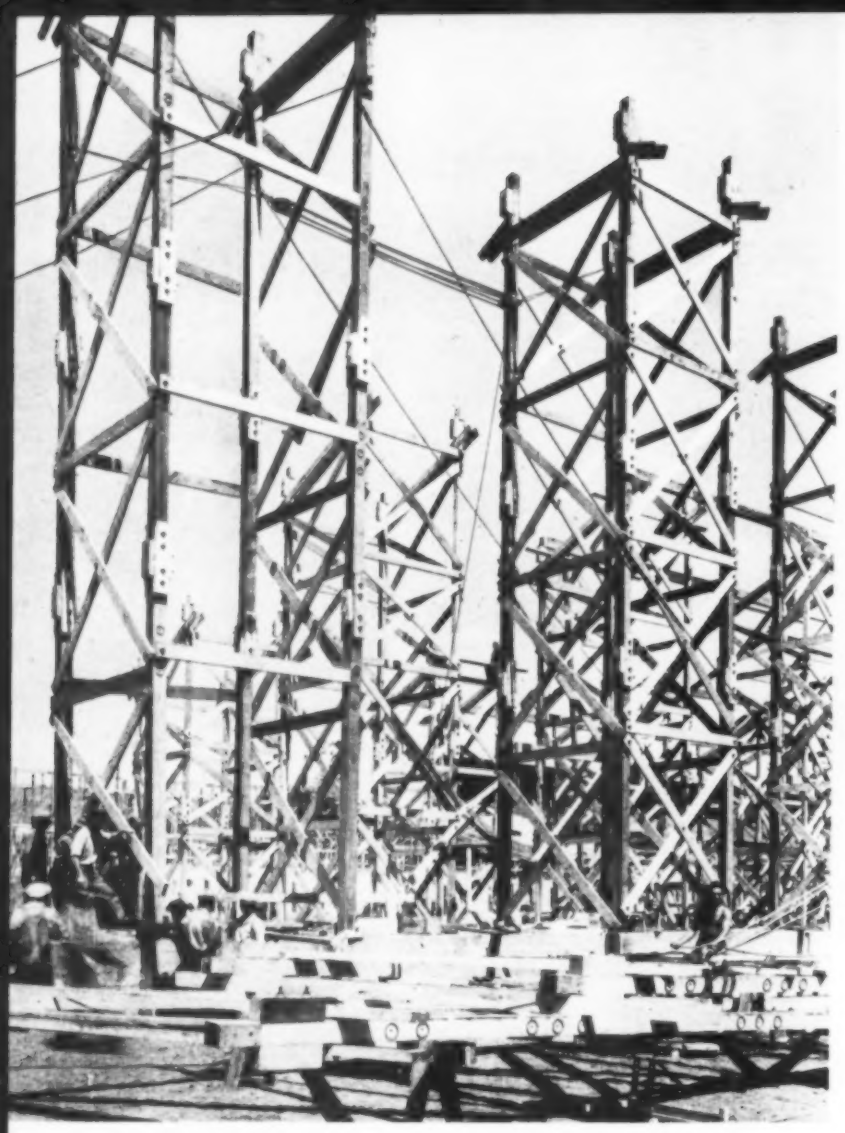
Manhattan-Long Construction Co., general contractors for the Tulsa plant, which will be operated by Douglas Aircraft Co., is using nearly a million dollars' worth of construction equipment, ranging from huge graders, trucks, concrete mixers, hoists and erecting cranes to wheelbarrows and small hand tools. Fort Worth has about the same amount.

The 27,000 tons of structural steel required for each plant was more than any single steel mill or fabricating shop

(Continued on page 103)



WHITE GLASS WOOL (below) is placed on 3/8-in. ribbed expanded metal lath to provide roof with 3-in. insulating blanket.



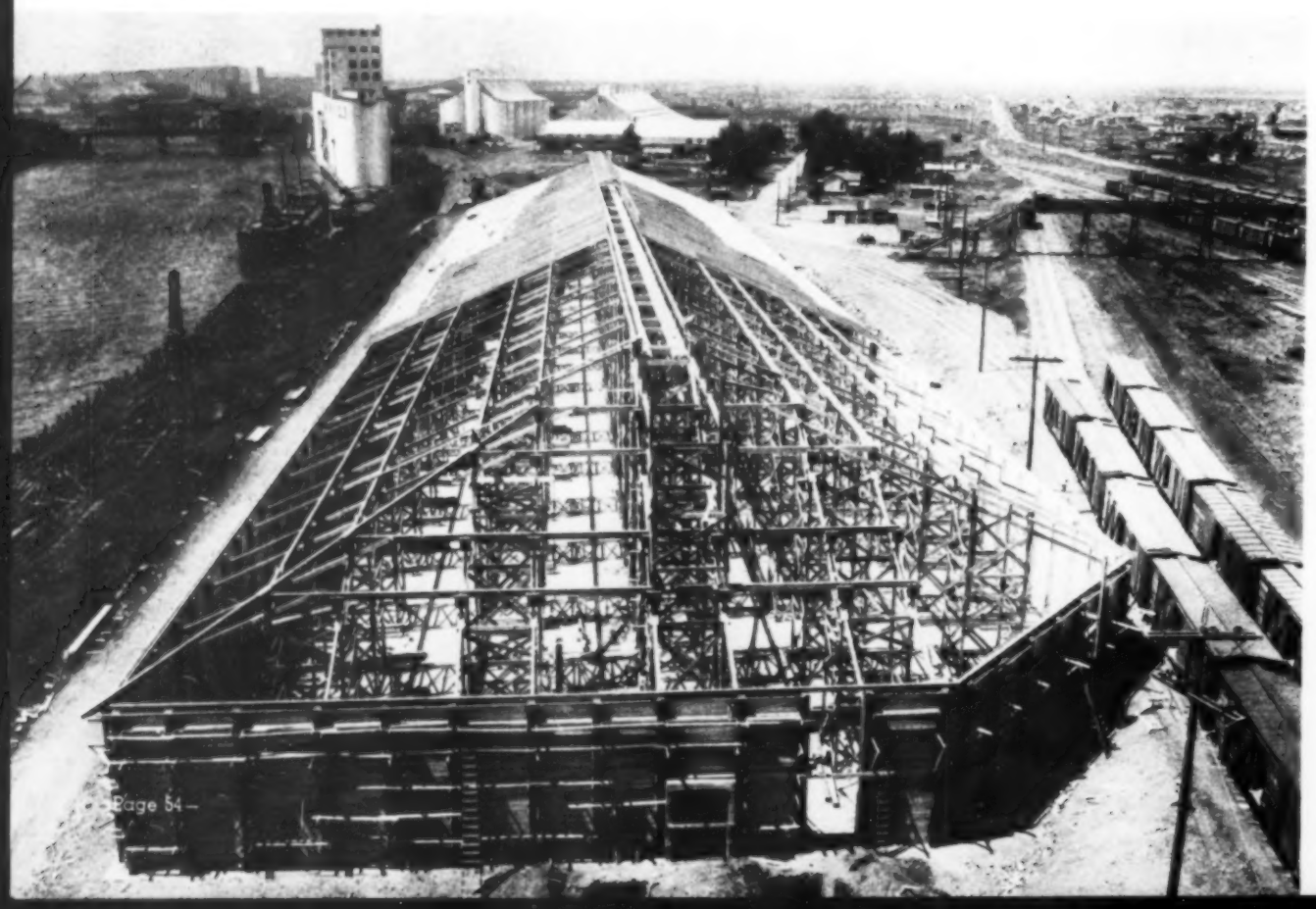
FOUR-POST TOWERS, fabricated with aid of timber connectors, support roof of big Canadian grain storage building.

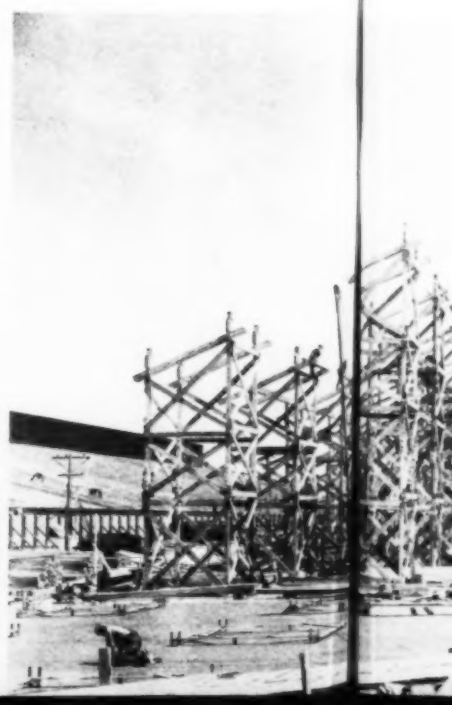
Timber Construction

Used for Big Grain Storage Building Project in Canada

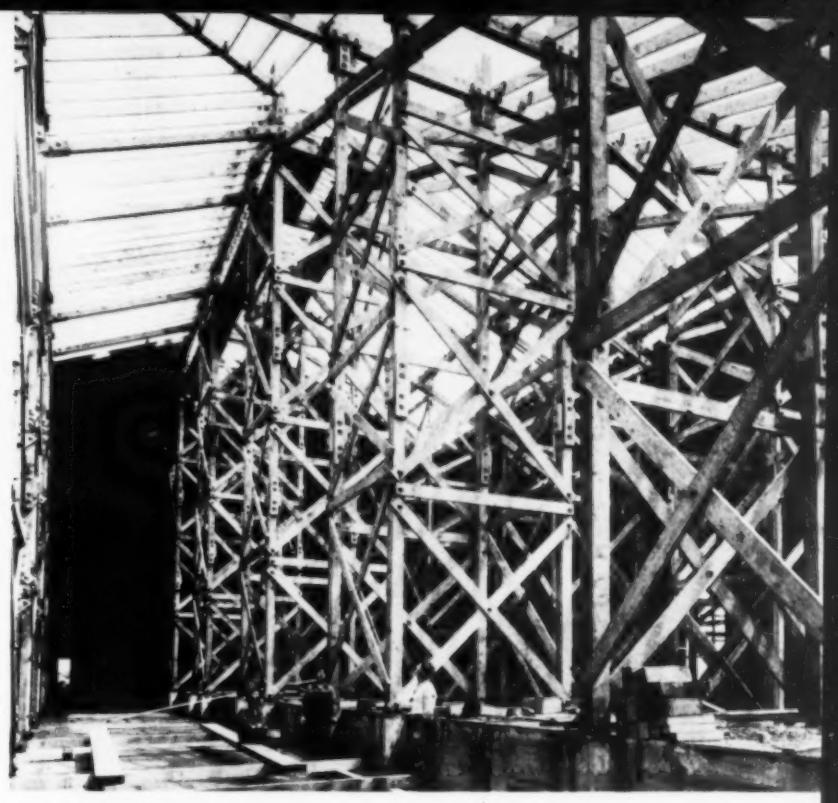
FOR GRAIN STORAGE (below) wood frame buildings have standard width of 144 ft. Four-post towers supporting roof with slope of 5 vertical to 12 horizontal are spaced on 28½-ft. centers. Side walls, sheathed with 2x6's, are 22 ft. high.

By ROBERT TURNER
Timber Engineering Co.
Washington, D.C.





BUILT-UP WOOD FLOORS are installed in number of grain storage buildings.



CROSS-BRACING secured by timber connectors is applied to all four faces of timber towers supporting roof.

ANTICIPATING A BUMPER, 500,000,000-BU. WHEAT CROP, the largest ever harvested in Canada, Dominion grain interests, in collaboration with their government, have completed at high speed the largest combined building project for grain storage ever undertaken. Enormous wood storage buildings have been erected at a dozen strategic points throughout the country under an emergency grain storage program. The Canadian government did not finance this project, but did underwrite its cost, which approximates $5,000,000. Orders for building materials were placed through a government control board which fixed the maximum price for every item used.

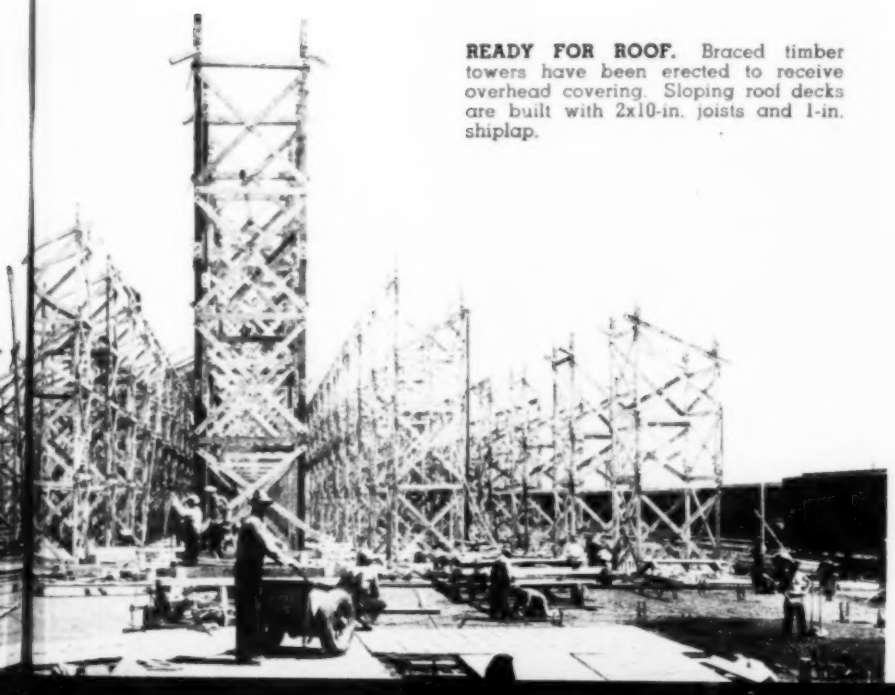
The C. D. Howe Co., Ltd., engineering firm which specializes in grain elevator construction, was assigned to design 22 of the buildings, comprising 27 compartments, with a combined capacity of 50,835,000 bu. As the question of cost was of major concern, the Howe company favored the Teco timber construction system which it found to be most economical. The standard width of the grain storage buildings is 144 ft., with lengths varying according to the capacity required. In all there are about 3 mi. of buildings. One building covers 6 acres.

Four general contractors participated in the project;

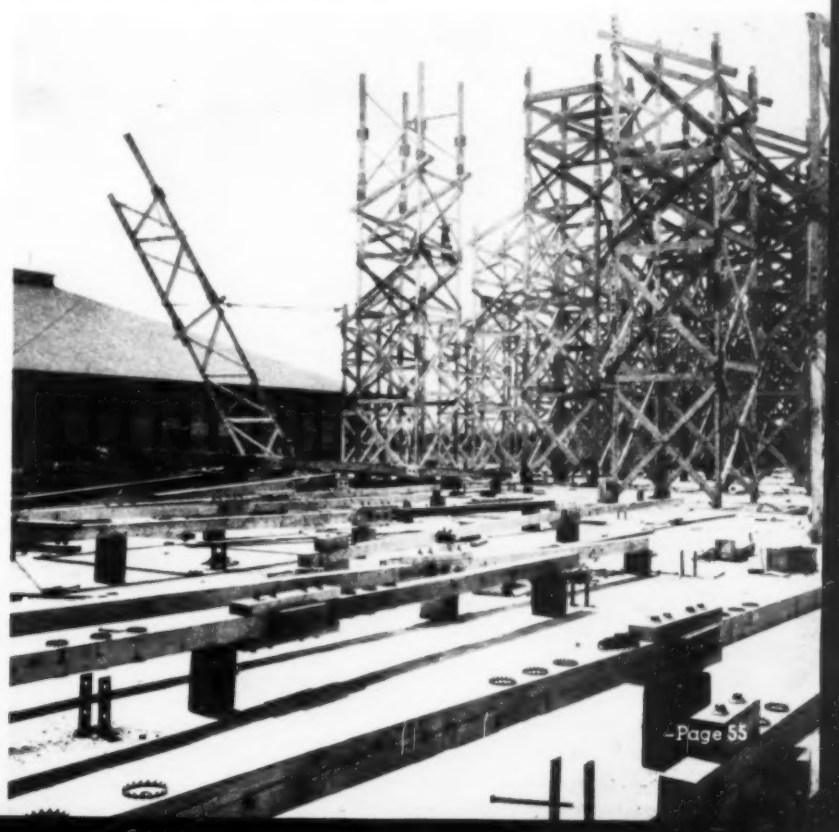
(Continued on page 97)

CONSTRUCTION OF SIDE WALLS involves use of 12x14-in. posts, on 9½-ft. centers, tied with diagonal 2-in. steel rods. Walls are built up solid with 2x6-in. and 2x4-in. sheathing.

FABRICATION OF TIMBER TOWERS (below) is done on floor of building with timber connectors, as shown in foreground. In left background tower leg is being raised into vertical position.



READY FOR ROOF. Braced timber towers have been erected to receive overhead covering. Sloping roof decks are built with 2x10-in. joists and 1-in. shiplap.

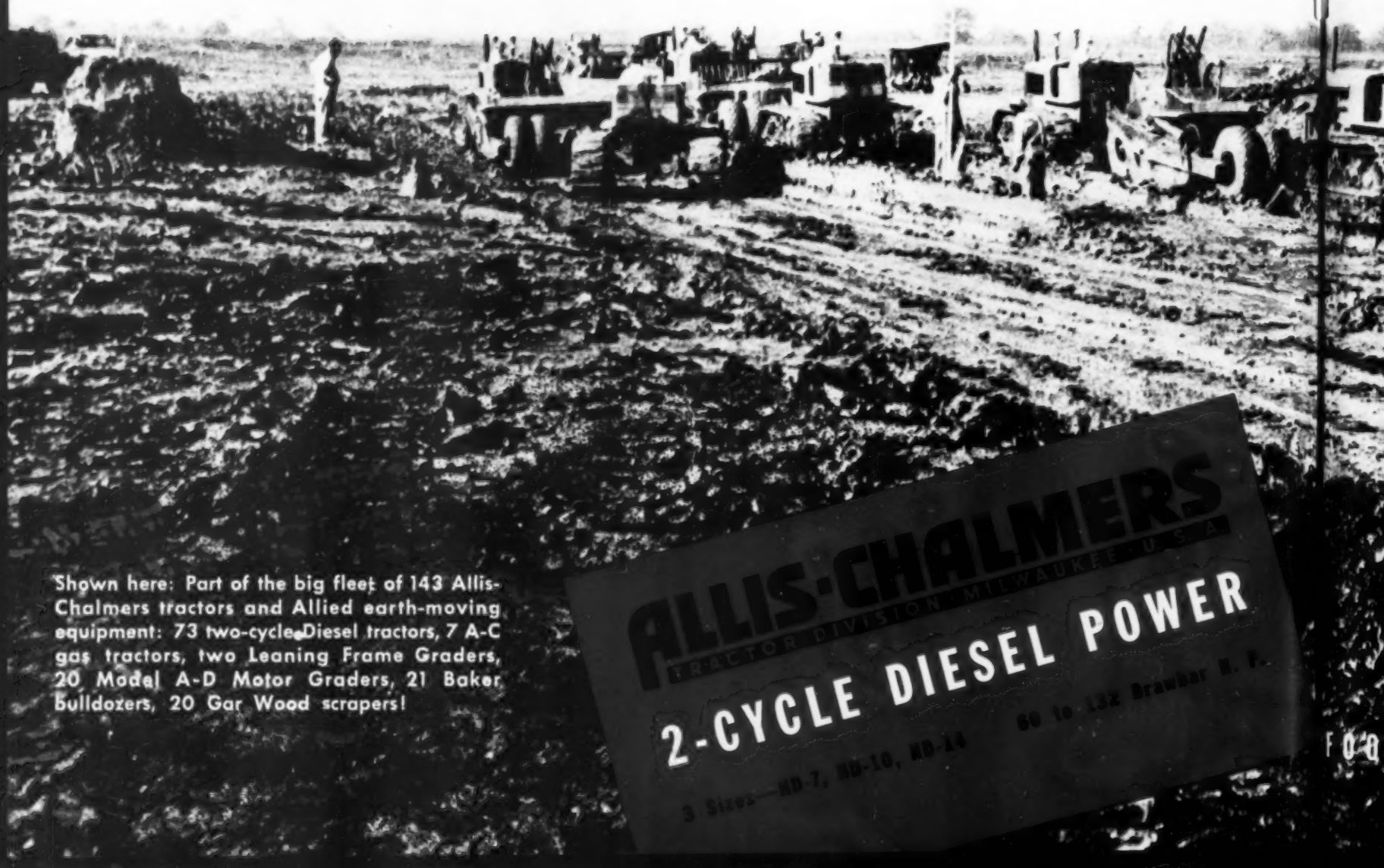


50,000 YDS.

W. E. Callahan Company, assembles huge array of tractors, shovels, trucks, graders and other earth-moving equipment to rush huge defense project . . .

BIG is a one-word description of what's taking place on the Southwestern Proving Ground, ordnance project, Hope, Arkansas. BIG the way Uncle Sam does it . . . and BIG the way W. E. Callahan Construction Company is doing it. Over 4,000,000 cubic yards are being moved . . . at the astounding daily average of 50,000 yards. 70,000 yards scored one day! The huge undertaking is being rushed through by "an array of equipment that rivals the claims of some highly

*** According to the Public Relations Dire**



Shown here: Part of the big fleet of 143 Allis-Chalmers tractors and Allied earth-moving equipment: 73 two-cycle Diesel tractors, 7 A-C gas tractors, two Leaning Frame Graders, 20 Model A-D Motor Graders, 21 Baker bulldozers, 20 Gar Wood scrapers!

A DAY

touted mechanized armies".* A major part of the big mechanized force are Allis-Chalmers and Allied manufacturers' equipment. 143 UNITS! 73 TWO-CYCLE DIESEL TRACTORS, 7 A-C GAS TRACTORS, TWO LEANING FRAME GRADERS, 20 MODEL A-D MOTOR GRADERS, 21 BAKER BULLDOZERS, 20 GAR WOOD SCRAPERS! On 24-hour duty . . . hitting a fast, steady pace . . . they're out for a record in time and cost . . . and are setting it!

ations Director of the Hope Project.

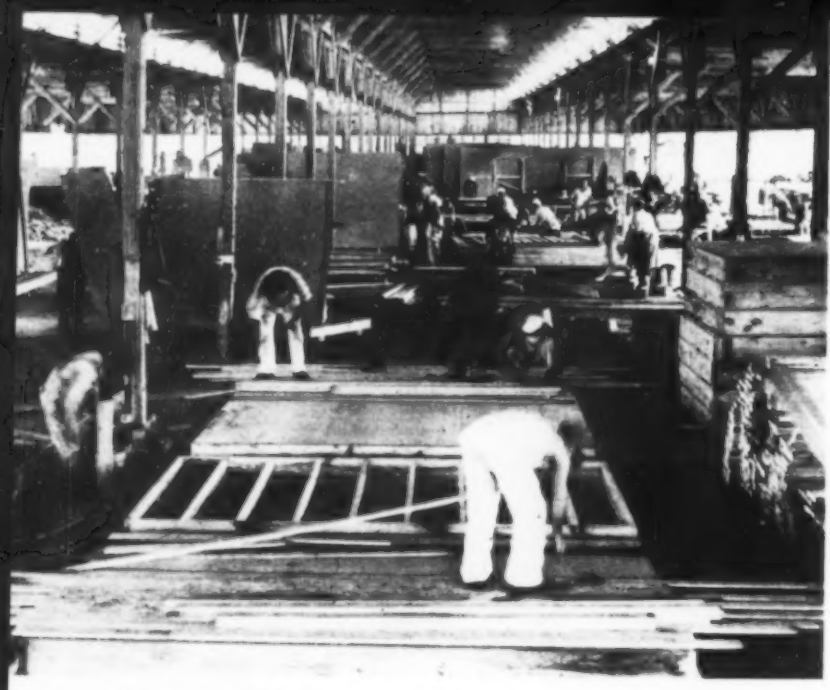
21 of these 2-cycle Diesels are equipped with Baker bulldozers. Operators throttle through bulldozing, smoothly, quickly. Hanging-on ability of 2-cycle engine means less gear shifting . . . more work done.

Valuable seconds are saved . . . more and bigger loads are hauled every hour with 2-cycle Diesel power pushing and pulling. You "gun" it and go . . . like "steam power"!

The 13-yd. Gar Wood scrapers are quickly loaded. You work in higher gear . . . at faster speed . . . you pull away with heaped loads and go into high speed in less time . . . shorten round trip time.

INVEST IN THE FUTURE OF AMERICA
Buy DEFENSE BONDS STAMPS

FOOD AND TRANSPORTATION . . . OUR FIRST LINE OF DEFENSE



SPECIALLY CONSTRUCTED MILL set up by contractors on Frisco R.R. 26 mi. from site turns out prefabricated sections for fifteen houses per day.

Prefabricating Shop

SPEEDS ERECTION OF 500 HOUSES IN 49 DAYS

By STANLEY A. BROWN
Manager, Barrett & Hilp
Newburg, Mo.

PORTABLE ELECTRIC SAW cuts large sheet of weatherproof insulating board applied to both sides of wall sections in fabricating mill. Insulating board is fastened to wall floor, ceiling and roof sections with both nails and glue, giving extra strength to panel construction.

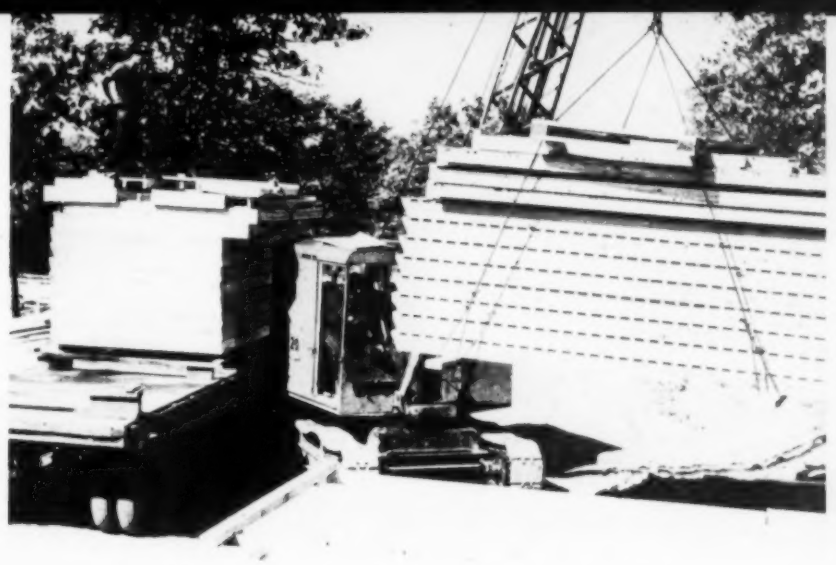
GABLE END is raised and set in position on erected wall sections by crew of nine men.

GABLE END (below) for party wall between row houses, where gable end will be concealed, utilizes waste pieces of insulating board as lining.

PREFABRICATION OF FLOOR, WALL, CEILING AND ROOF SECTIONS in a large shop specially constructed at a railroad delivery point 26 mi. from the job enabled Barrett & Hilp, contractors, San Francisco, to complete 500 defense houses adjacent to Fort Leonard Wood, Mo., in a period of 90 calendar days after receiving notice to proceed with the work, as stipulated by the contract agreement with the Defense Housing Division of the Federal Works Agency. Built to accommodate families of non-commissioned officers of Fort Wood, the houses are individual one-story, five-room, gable-roof dwellings of a demountable type designed for easy disassembly and high salvage, framed of wood and lined inside and out with weatherproof insulating board. Harland Bartholomew and Associates, St. Louis, Mo., made the site plan and inspected the construction for the FWA Defense Housing Division. The 500 houses cost $1,530,000.

Located on rolling, hilly land not far outside the fenced reservation at Fort Leonard Wood in the heart of the Ozark Mountains, the shallow depth of soil at the site required that foundation piers for all the houses be placed in rock. Excavation for concrete piers; setting of precast posts for the piers; erection of prefabricated house sections, porches, and coal bins and placing of interior and exterior trim were the major labor operations in the field. Homasote, an insulating

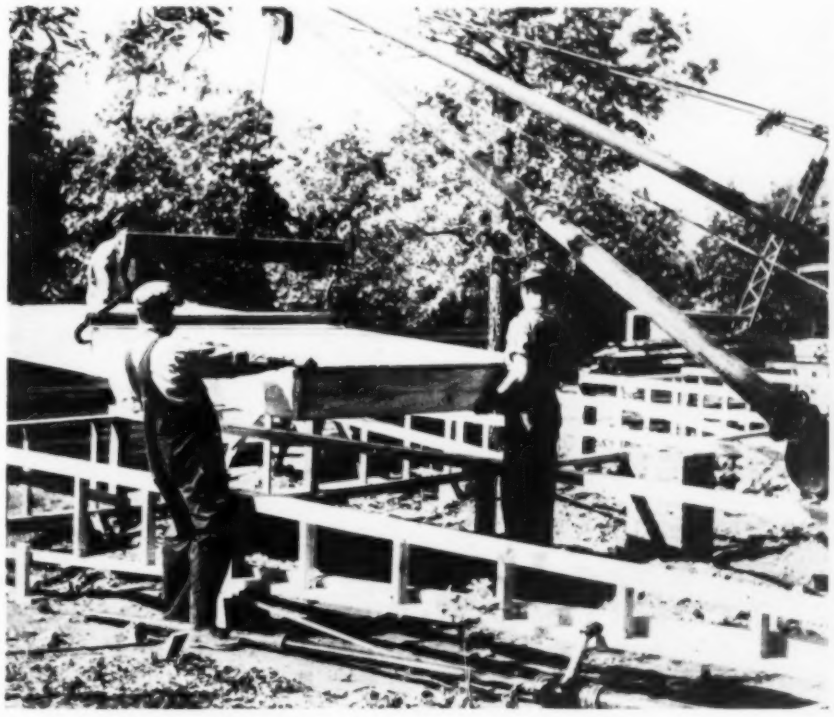
A-FRAME BOOM on rear end of improvised truck crane raises ceiling section for placing on completed walls of house.



TRANSPORTED TO SITE on semi-trailer, prefabricated sections for complete house are unloaded by crane and placed alongside foundations.

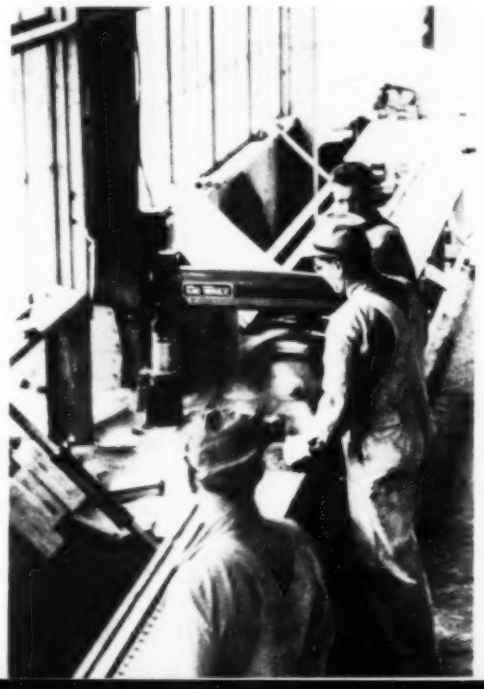
weather-proof board manufactured by the Homasote Company. Trenton, N. J., was applied to all interior walls and ceilings, as well as to the house exteriors, both side walls and roof, and to the underside of finish floors.

House Foundations—Field work was complicated by the necessity of removing an average of 1 cu.ft. of rock from each pier excavation. The rock was excavated by using air compressors with pavement breakers and clay spades which allowed sufficient speed to keep the field foundations ahead of the fabricated units coming out of the shop. To carry out a decision to use precast concrete piers, a central fabricating plant for the precast units was set up at the beginning of the job. The construction schedule drawn up by the contractor called for completion of fifteen houses per day, requiring a capacity of 225 piers per day in the field and at the casting



SPECIAL FRAME TONGS hung from boom on rear end of truck place floor section on framed girders resting on concrete piers at sloping site. Soil and water pipes are prefabricated by plumbers ready for quick installation.

UNIVERSAL-ADJUSTMENT ELECTRIC SAW (below) aids dimensioning and shaping of structural members for prefabricated panels and for door and window frames.



WALL SECTIONS (below) lined inside and out with insulating board possessing weather-resistant qualities are set and tacked on top at joints prior to being fastened with lag screws through continuous wall plate.

CEILING SECTION faced on lower side with insulating board is handled into position by truck-crane equipped with A-frame boom.

ROOF SECTION containing opening for brick chimney through weather-proof insulating board is raised by erection crew.

BRICKLAYERS complete fourth and final stage of chimney construction from roof to topping. Gable ends of row houses on slope are partly exposed.

plant. Special demountable forms were developed for casting pier units in the plant. After the piers had cured, they were placed on specially constructed sleds which were taken to the house location by a carrier.

As a base for the precast pier unit, a footing 20 in. square and 6 in. thick was placed in the rock foundation. In building these bases for the piers, concrete was poured into a box designed to hold exactly the correct amount of material. After the box had been filled from the concrete mixer, the mason emptied out the material and used the box to puddle the concrete comprising the footing. Sufficient time was allowed for the concrete footings to take their initial set, and the precast piers then were positioned alongside special 2x6-in. templates, which had been located from points set with a transit.

Fabricating Shop—To prefabricate all the houses, the contractor built at Newburg a $40,000 plant designed for an output of fifteen houses per day, the rate of production when

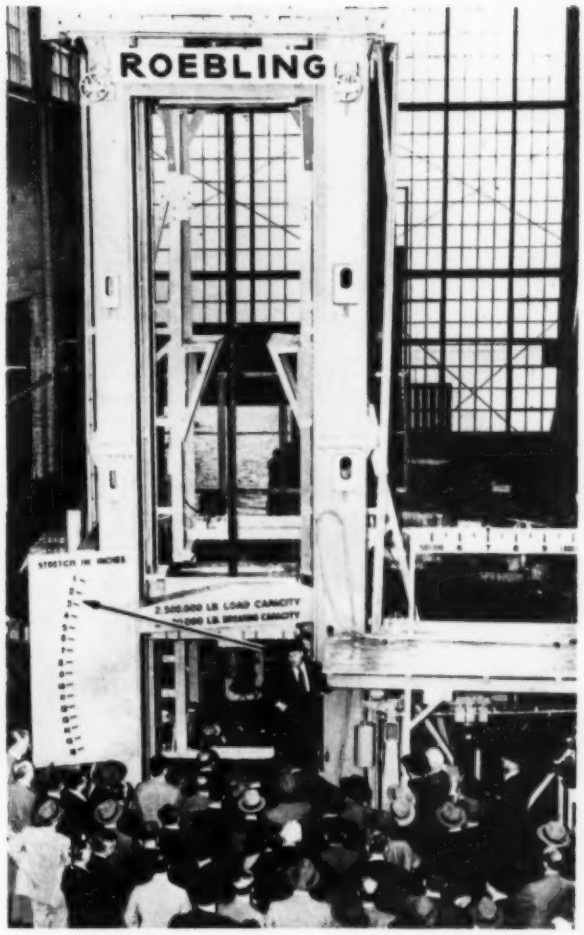
(Continued on page 93)

WET WEATHER (below) handicaps field work but does not prevent completion of 500 houses in 49 calendar days from start of erection.

Job oddities

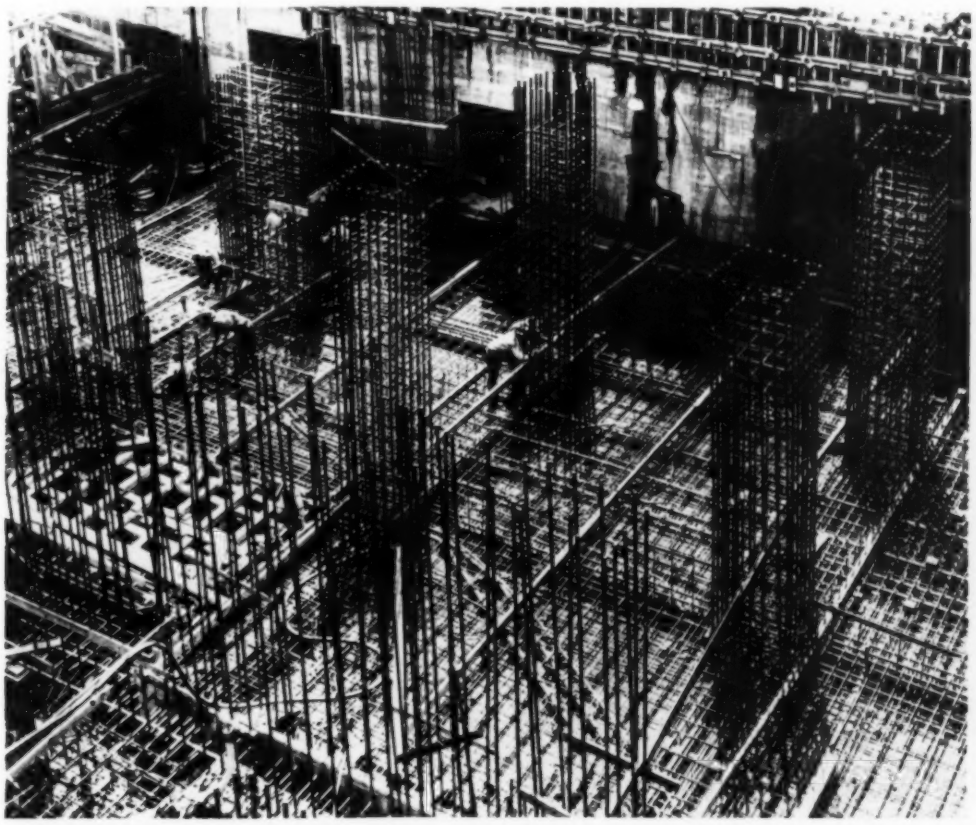
DOG-HOUSE DE LUXE for official job mascot, Bomber Annie, is provided by 4,500 construction workers of The Austin Co., engineers and contractors, on huge aircraft assembly plant for Consolidated Aircraft Co. in Fort Worth, Texas, described elsewhere in this issue. Dog-house is only structure on site of "blackout," solid-wall factory project that has windows.

POSTAGE STAMPS of Union of South Africa in six-pence denomination, printed in both English and Afrikaans, depict welder using modern shielded-arc equipment, in recognition of important part welding is playing in defense effort, according to Lincoln Electric Co.



TOUGH BREAK is experienced by this huge 4-in. wire rope which was pulled apart under load of about 1,500,000 lb. in powerful testing machine during ceremonies marking 100th Anniversary of John A. Roebling's Sons Co., Trenton, N. J.

WOMAN WELDER is Mrs. Louise Walsh Austad, of Tucson, Ariz., who has been employed as an operator for five years and is wife of welder. Most of her work has been on shop fabrication, such as pressure tanks, trailer frames and steel trusses. She has also done maintenance welding on worn parts, shovel teeth and tractor idlers on construction equipment, using Lincoln arc welders and electrodes.

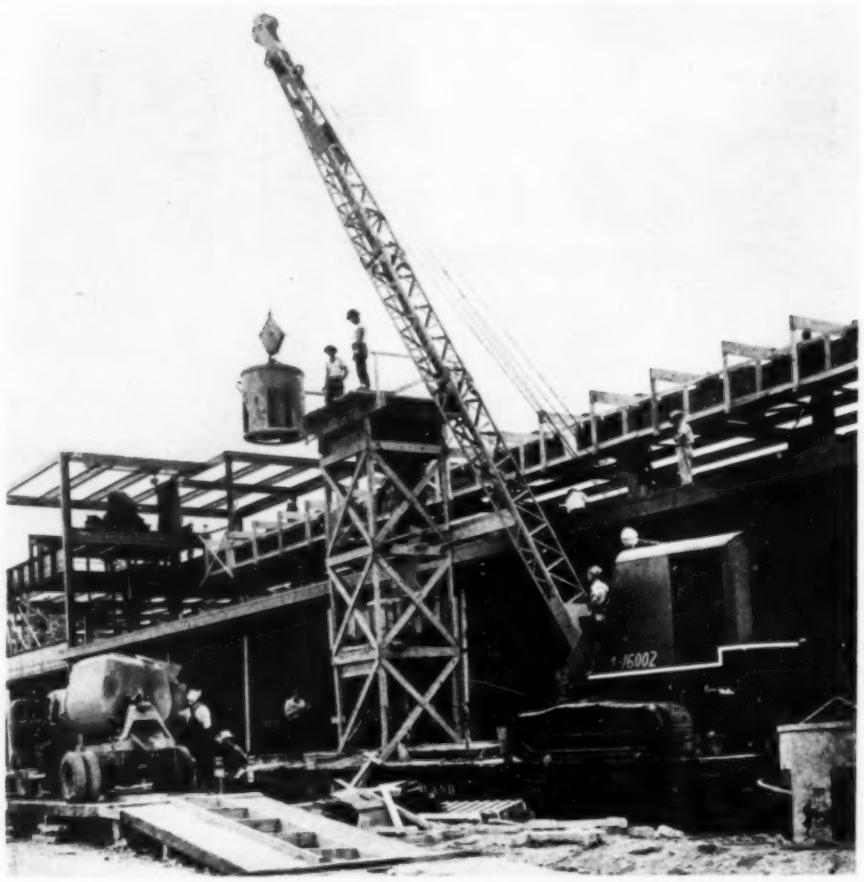


STEEL REINFORCEMENT APLENTY insures strength of powerhouse at U. S. Bureau of Reclamation's Shasta Dam project in California where operating machinery of tremendous weight must be supported. Each generator of five main power units weighs 850 tons.

HOW They Did It

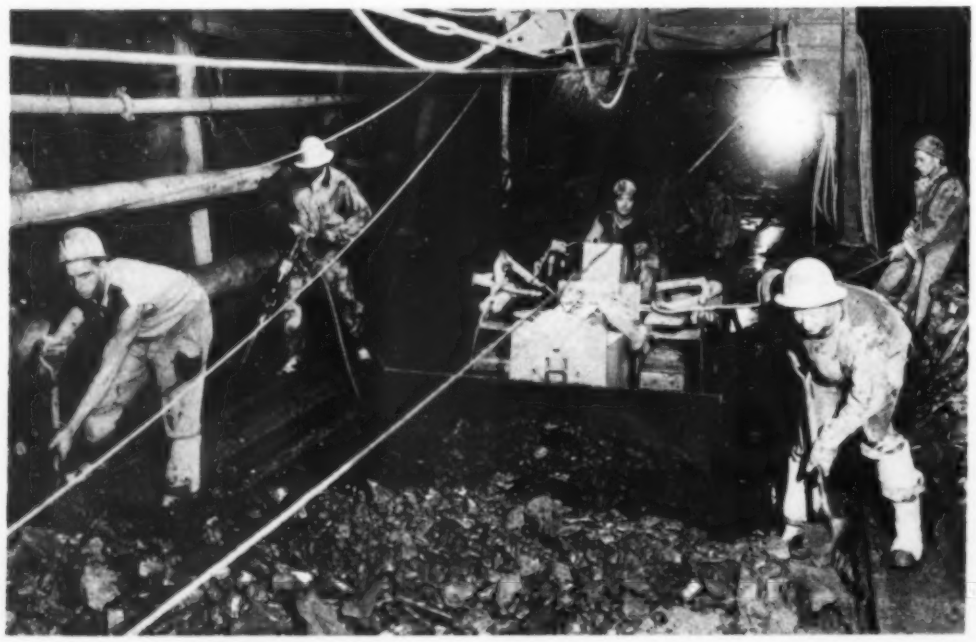
CONSTRUCTION DETAILS

For Superintendents and Foremen

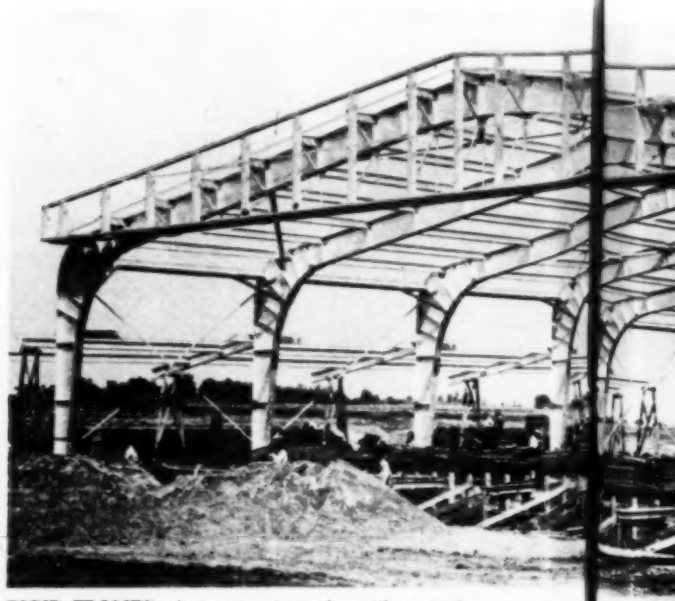


MOUNTED ON RAILWAY FLAT CAR is crane and tower rig for delivering concrete to 1,200-ft-long building under construction at Army Ordnance Plant, St. Louis, Mo., by Fruco Construction Co. From truck-mixer concrete is handled in 1-cu.yd. bucket by ¾-yd. Bay City 10-ton diesel crane with 50-ft. boom serving hopper atop 45-ft. high tower, with chutes to both second floor and first floor levels. Flat car is moved from one setup to another by cable on the front drum of crane. Mobile outfit handles 540 cu.yd. of concrete in a 9-hr. shift.

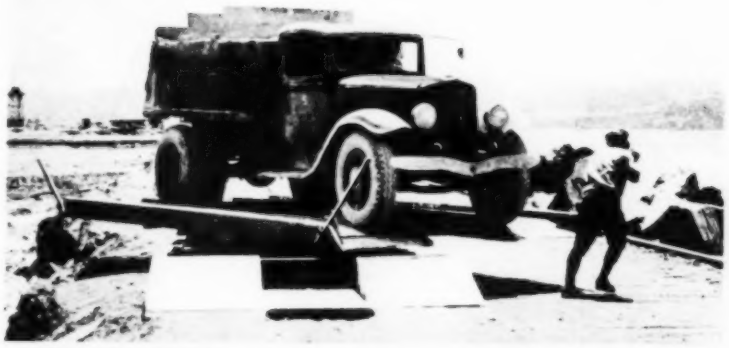
FOR NIGHT LIGHTING (left) of construction work on Lexington County Airport in South Carolina, mobile rig consists of truck mounted Caterpillar diesel-electric unit serving four floodlights on vertical standard.



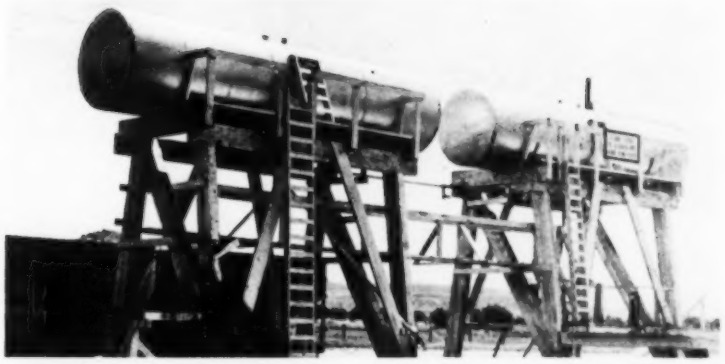
ELECTRICALLY POWERED TRACTOR cleans up muck in Delaware Aqueduct tunnel constructed by Associated Contractors, Inc. of Valhalla, N. Y. To eliminate fumes from tractor unit, diesel engine was removed and replaced by 20-hp. electric motor served from power line in tunnel. Revamped Caterpillar tractor is equipped with a LaPlant-Choate bulldozer with special blade curved to fit circular invert of bore. Details of electric tractor rig were worked out by Ralph Johnson, of the H. O. Penn Machinery Co. in consultation with C. D. Riddle, chief engineer for the contractor.



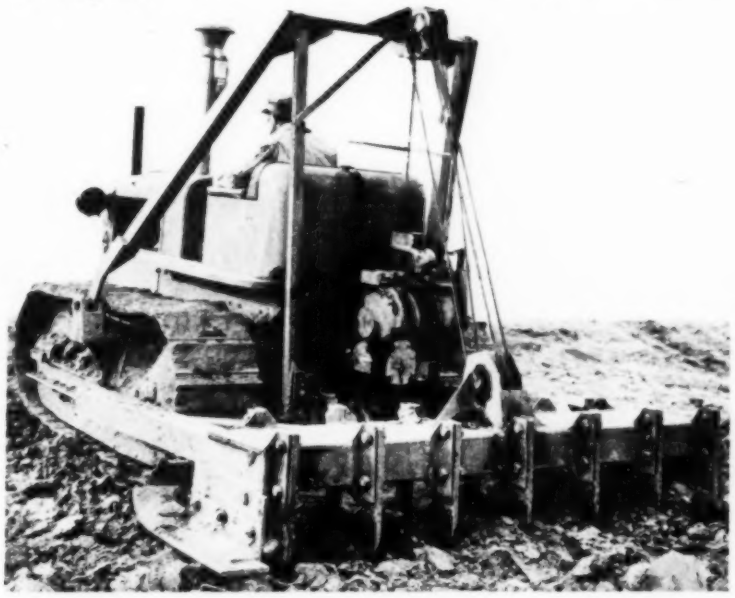
RIGID FRAMES of structural steel, until recently employed chiefly for bridge construction, are finding a wide field of application for industrial buildings and airplane hangars, according to the American Institute of Steel Construction. Standard



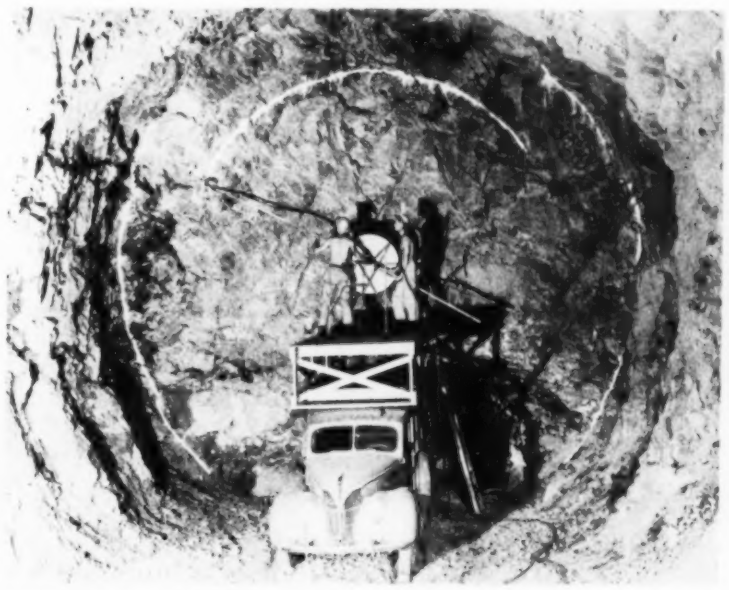
QUICK TURN-AROUND for trucks in restricted spaces on road-building and other types of construction is made possible by this Blaw-Knox turntable, operated by one man. Simple mechanism includes circular pan or "sled" on which table rotates. Steel ramps at both ends are connected with turntable by steel angle frames. Turntables are designed to handle loads from 8 to 27 tons. After truck dumps batches into paver and starts back on return trip, it can be either driven over turntable or bypassed alongside on subgrade.



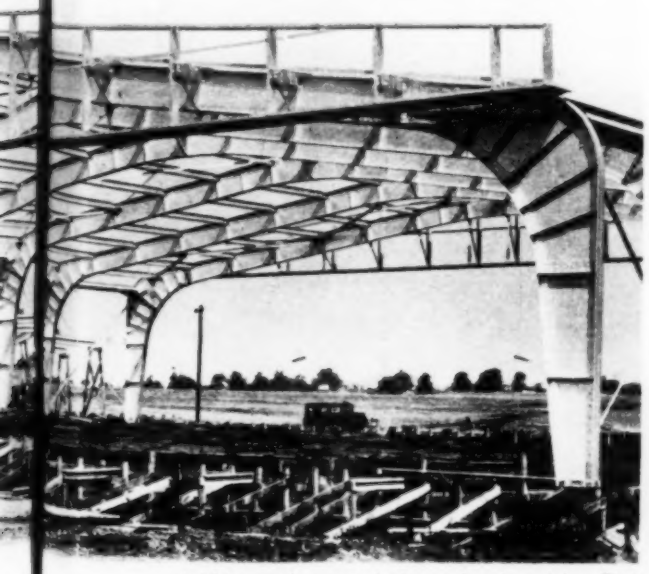
FOR FUEL OIL STORAGE at Friant Dam, in California, Griffith Co. and Bent Co. use pairs of 5,500-gal. tanks elevated for gravity flow and mounted on semi-portable supports. Skid mounting enables tractor to hook on and drag tank to new setup. The two tanks are connected by pipes and valves so that they can be drawn upon together or separately, as desired.



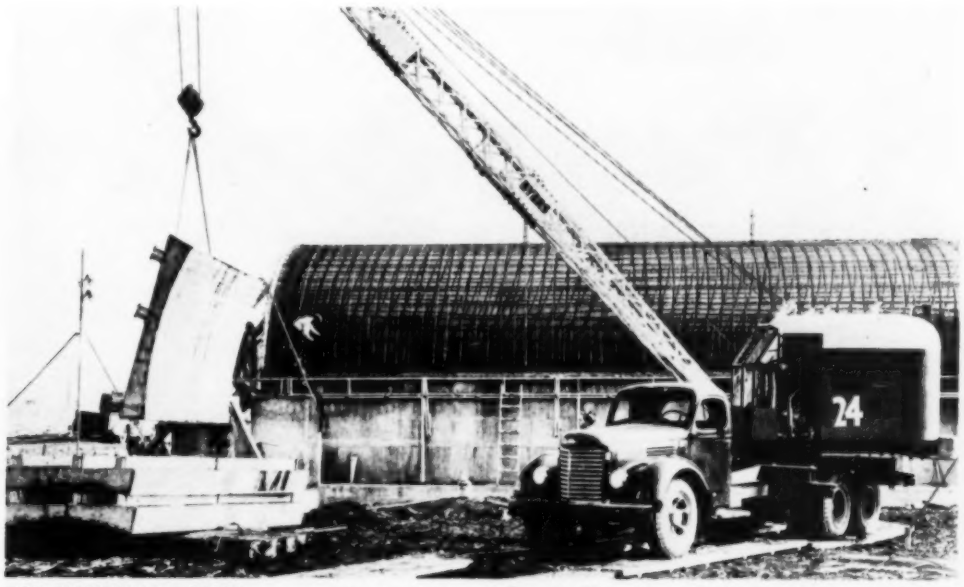
FOR LOOSENING HARD MATERIAL in connection with earth-moving operations for a reservoir of the city water supply system at Brea, Calif., D. J. Willis & Son, Los Angeles contractor, uses heavy-duty scarifier with two rows of staggered teeth mounted on rear end of Allis-Chalmers diesel tractor.



MARKING OF WORKING FACE in 27-ft.-diameter penstock tunnels at Parker Dam, U. S. Bureau of Reclamation project in California, is done by spraying circular paint lines on rock to guide drillers. Outfit mounted on truck includes protractor and 18-ft.-long pole carrying paint spray gun operated by compressed air fed through small hose. Pole carries steel tape for measuring diameter of circular marking.



rigid-frame hangar designs, developed by Civil Aeronautics Administration, have been adopted, sometimes with modifications, for many civil and military airports.

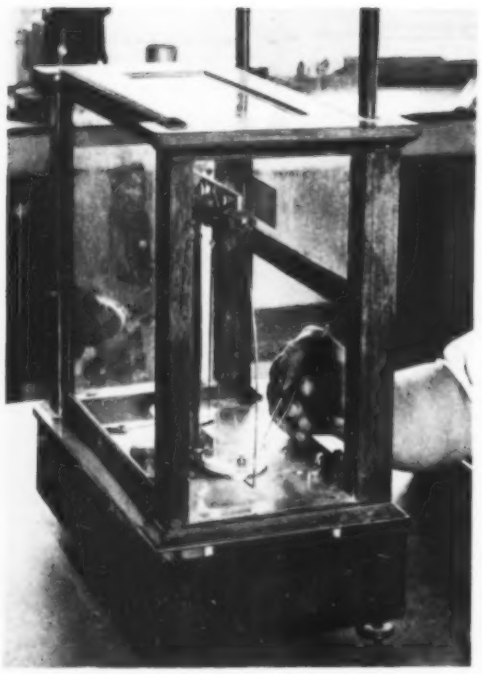


FOR HANDLING FORMS on concrete structures at Army's Kingsbury Ordnance Plant in Indiana, Bates & Rogers Construction Co., of Chicago, uses mobile outfit comprising International six-wheel truck carrying Byers crane.

Diamond Drilling Practice

DEVELOPED AT GRAND COULEE DAM

FOR CORES UP TO 10 IN. IN DIAMETER



WEIGHING OF DIAMONDS is done on precision balance. Weights are determined before mounting and after dismantling diamond drill bit, thus keeping close check on wear and any other losses.

IN SMALL BITS holes are drilled for stones on inside and outside peripheries. Each stone has its own drill size.

FITTING OF STONES in prepared bit requires care by experienced worker.

SOFT STEEL OF BIT is worked up around stone by calking process.

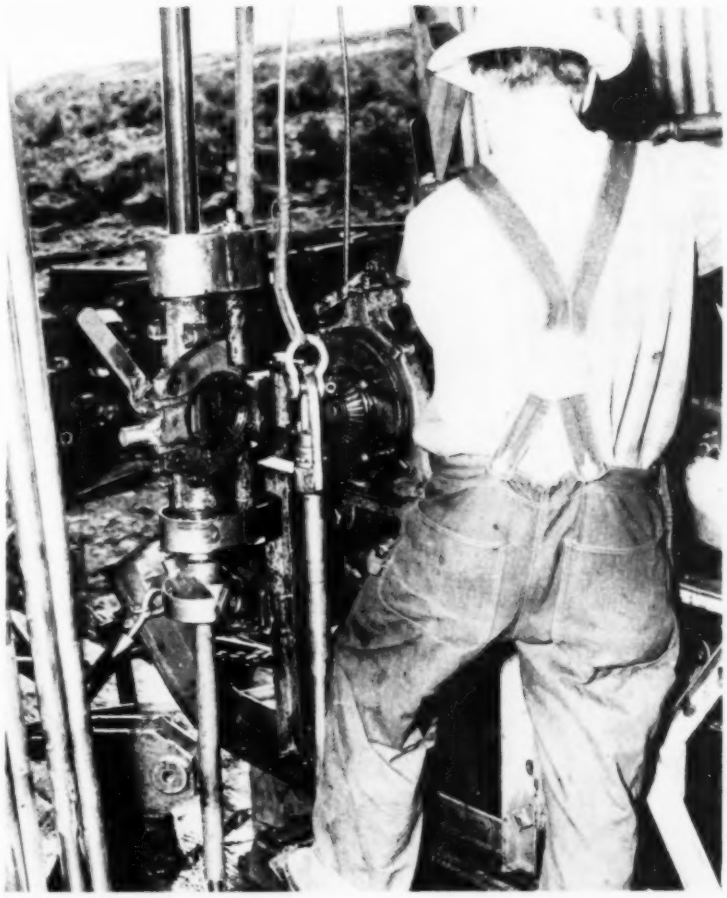
THIS ROW OF DIAMOND DRILL BITS, in which two largest sizes are not set with diamonds, includes following diameters: 15/16, 1 5/16, 1⅝, 1⅞, 2½, 2½-in. special, 4-in. (with 4½-in. reaming shell), 6 in., 7 in. (giving 6¾-in. core) and 10 in. which gives 10-in. core. Portions of core are shown in front of first four, at left; behind 7-in. bit is portion of concrete core to which is attached piece of reinforcing steel that was drilled out with core.

DRILL BITS STUDDED WITH DIAMONDS, some $20,000 worth, have been busily at work seven days a week at Grand Coulee Dam, in Washington, making core-borings in testing foundations and in other exploratory work. Up to the first of this year, the linear footage of this core-drill work by employees of the U. S. Bureau of Reclamation totaled about 43,000 ft. The drill crews, of which three are ordinarily on the field, even go into the galleries of the dam itself and cut cores 10 in. in diameter out of the concrete. Such cores include any of the steel reinforcing that happens to be encountered.

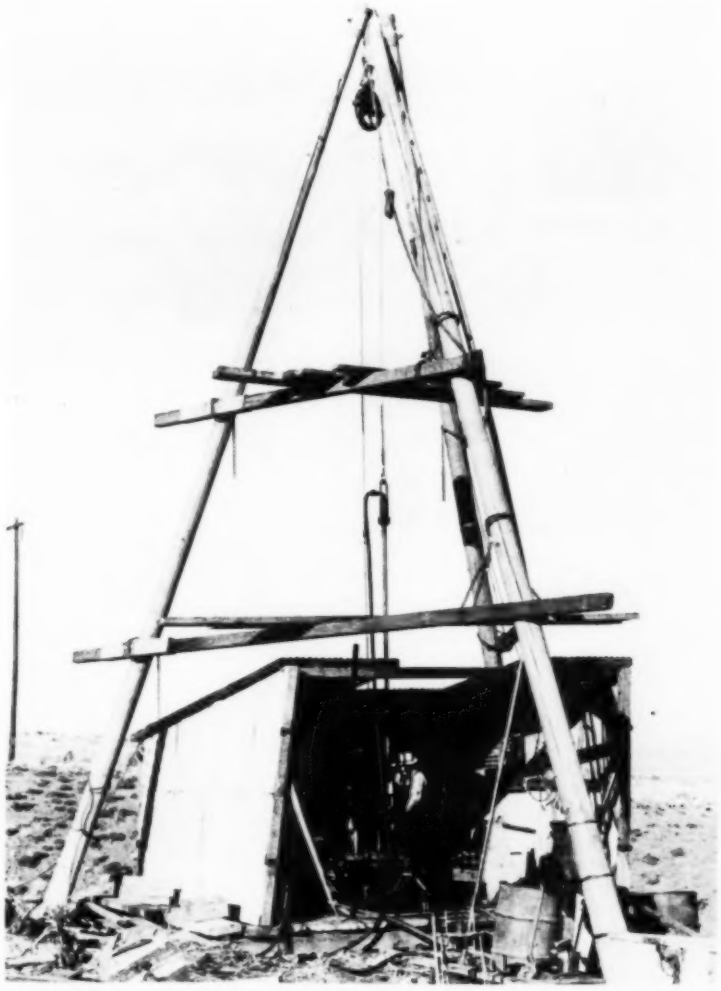
For work at Grand Coulee Dam the Bureau of Reclamation has not contracted the core drilling; instead, crews have been assembled to select the diamonds and to make up and maintain the diamond drill bits right on the job. Thus a great deal of experience has been accumulated in supplying, operating, and maintaining the drill rigs.

Drilling is done not only near Grand Coulee Dam but also on other parts of the Columbia Basin Project as a whole, such as at both of the proposed storage dam sites in the Coulee, at bridge sites up the river, and wherever foundation exploration has been a pre-construction requirement. In all of this work not a single large diamond has been lost. The experience gained, in shop and field, in making up and operating drills set with "carbon," as the black diamonds are called, has developed the technique outlined in the following notes.

When additional diamonds are needed, the Bureau calls for bids just as bids are invited on other construction equipment. In four bid openings to date, the diamond purchases have ranged from $2,000 to $10,000 at each opening. Dealers who come to these openings bring their wares with them, and submit not only a price per carat for each lot, but



CORE PIPE IS REMOVED for changing or checking bits and to remove core. Operator's foot is holding down device that prevents loss of flush-jointed drill pipe down hole. Gear box has been swung out of way and lifting hook is attached to top of pipe.

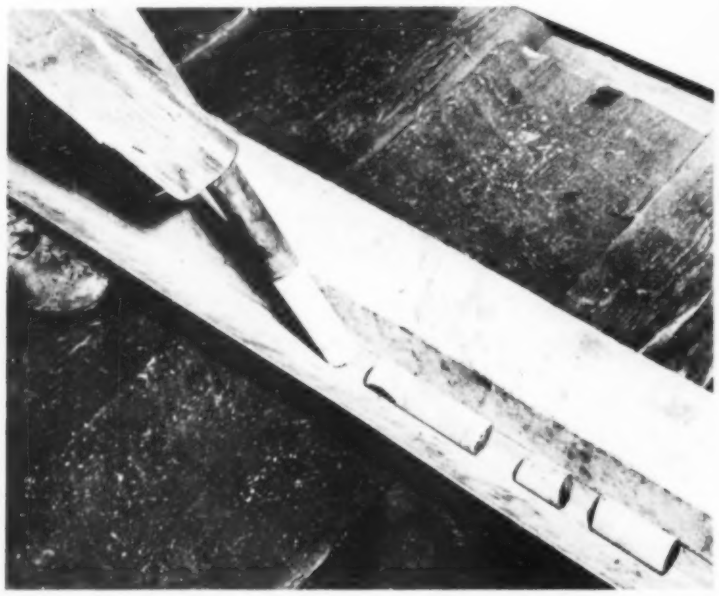


TYPICAL DIAMOND DRILL OUTFIT is set up to handle two 10-ft. lengths of drill pipe.

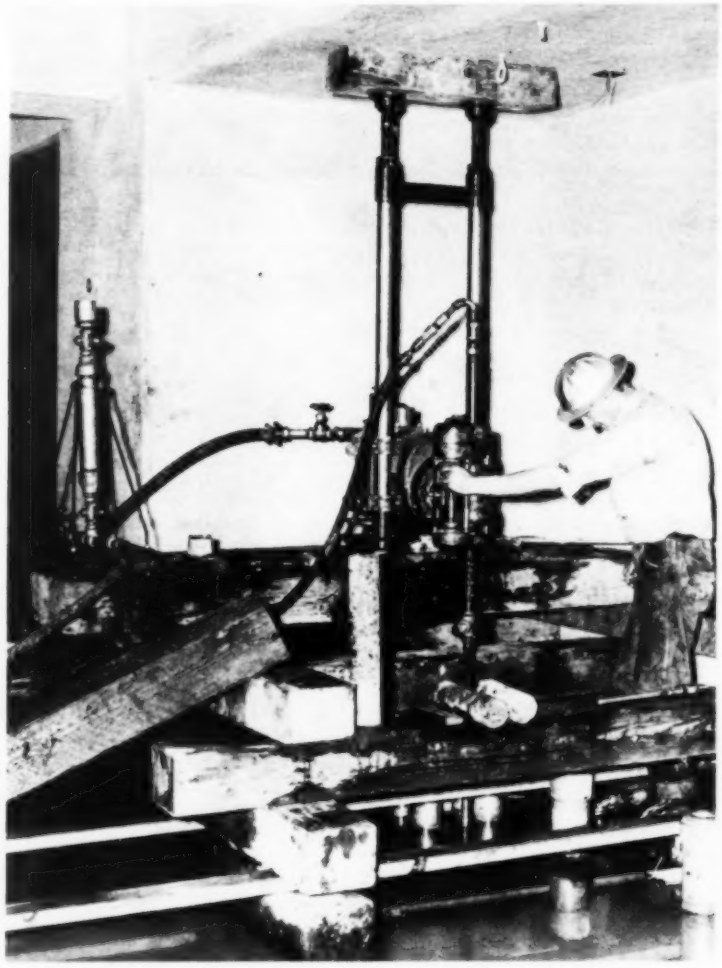
DIAMOND DRILL BIT and length of drilling pipe is here supported on bench on which assembly and dismantling take place.

BIT HAS BEEN REMOVED as core remains in drill pipe. End of core sleeve is visible inside drill pipe.

SLEEVE CONTAINING CORE is being withdrawn from drill pipe.



WHEN SLEEVE IS TAPPED with 2x4, core drops out into receptacle where it is examined.



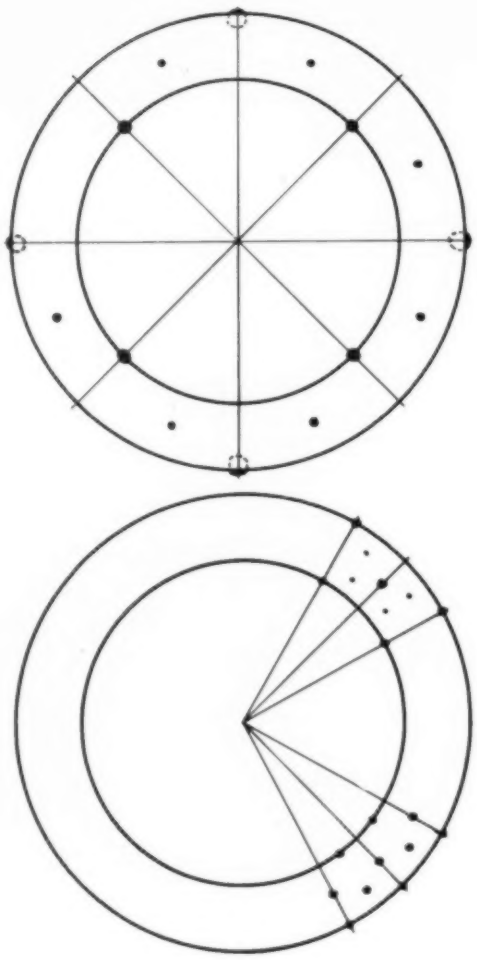
IN GALLERY of Grand Coulee Dam Sullivan air drill operates concrete coring machine.

usually offer the option of selecting any desired stones at a stipulated price per carat usually only slightly higher than the lot rate. It is the custom of the Bureau to buy on the latter plan because this makes it possible to select stones best suited to requirements of the job.

Diamonds are said to be the only construction tools (or materials) whose value increases with use. Long usage is proof that there are no flaws, and that weak corners have been worn off. Good used stones are rarely offered for sale—drillers just don't turn them in. Some large carbons increase 20 to 30 per cent in value after being used due to improved shape and proved quality (absence of flaws). This is only true of stones exceeding 2 carats in weight. Smaller carbons rarely appreciate and are more likely to depreciate. A 2-carat stone is well suited to the amount of metal in a bit (bit thickness) and also the curvature of the smaller sized bits which are used most extensively. As the stones become smaller they have to be reset more often due to lack of contact surface with bit metal.

New stones are broken in with old stones. For example, in setting 8 filler stones, it is common practice to use 6 old and 2 new stones. The new stones should be set diametrically opposite for best results. Setting cost on new stones is greater than for old, due to difficulty in setting, largely because of shapes and more metal to calk around stone.

(Continued on page 80)



PATTERNS USED IN SETTING CARBON AND BORTZ BITS

(Above left) CARBON BIT, AX size: Total, 16 stones; 4 stones on outside cut clearance but are not exposed on face; 4 stones on inside cut core and ahead; 8 filler stones set in circle midway between outer and inner faces cut ahead.

(Below left) BORTZ BIT, AX size: Upper portion of sketch illustrates 2-2 pattern requiring about 80 stones; a different pattern, repeated around bit, is shown in lower portion of sketch.

Reclaimed Pipe

WELDED INTO STADIUM FRAMEWORK

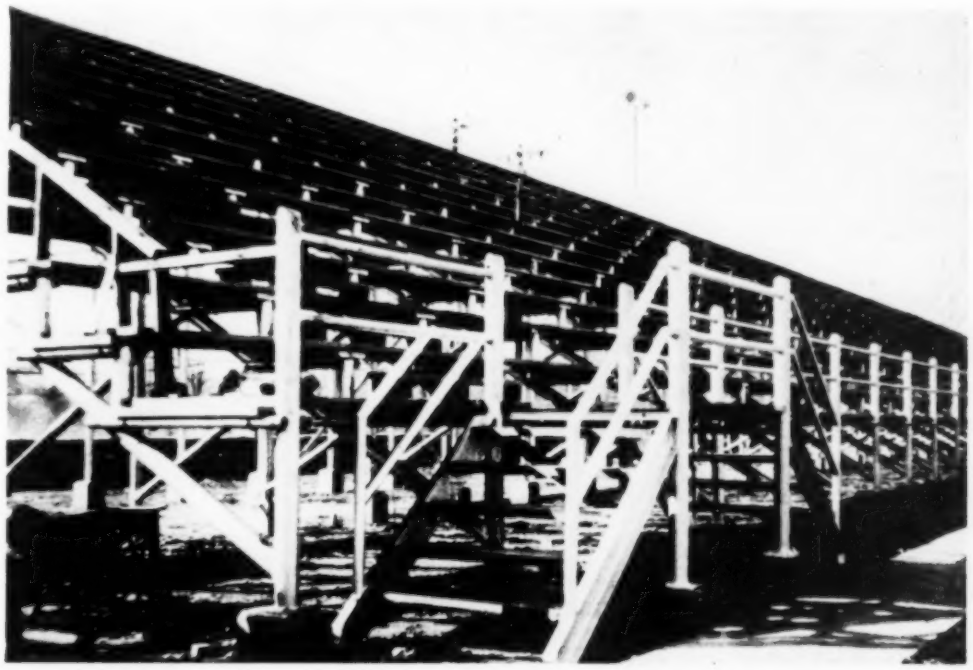
STADIUM FRAMEWORK of arc-welded pipe, 24 ft. 4 in. high, carries 13 rows of seats and provides space underneath for bus storage.

A 4,000-SEAT STADIUM utilizing reclaimed steel pipe arc-welded for the framework was built for the Weston (W. Va.) High School at an estimated cost saving of 50 per cent. The structure was designed by Donald Foster of the National Youth Administration, and the construction was supervised by J. B. Dempsey, instructor of welding at Central High School, Parkersburg, W. Va. The stadium was built by NYA workers, including three student welders, who complete the job in about 5 months, working 35 hr. per week.

The grandstand is built as a unit, 300

(Continued on page 96)

TWO SIZES OF PIPE are welded after larger is slit and reduced in diameter.



SEATING CAPACITY for 4,000 spectators is provided by grandstand with welded pipe framework.

INTERMEDIATE PIPE COLUMN, with steel plate bolted to concrete base, has welded diagonal brace of 3-in. pipe.

FRAMING AT REAR shows columns, stringers, diagonal bracing and pipe railing at top.

Precast Concrete Joists

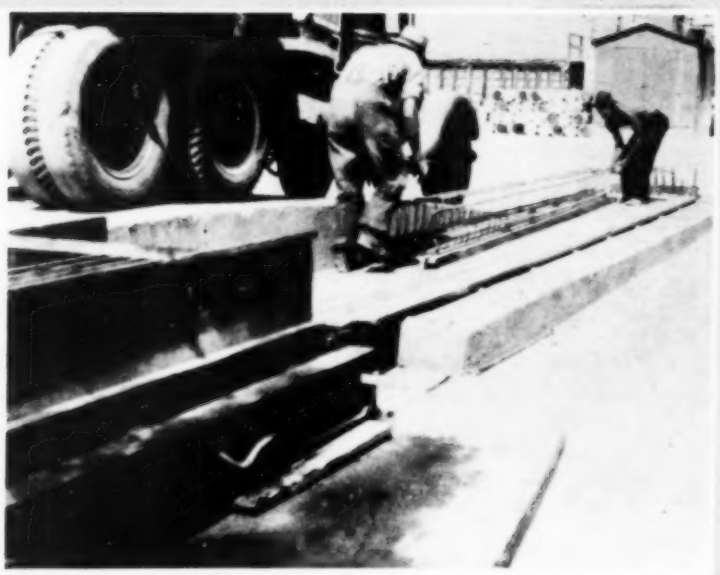
CUT COST OF NAVY WAREHOUSE

A SAVING OF NEARLY 25 PER CENT in estimated cost of construction of a two-story, 175x550-ft. warehouse and mold-loft building for the Navy Department's shore establishment at San Pedro, Calif., was realized by employing precast floor joists and beams, manufactured at a nearby yard where special equipment and methods were designed for production by "factory" methods. About 1,600 prefabricated reinforced concrete members, providing for support of a floor area of 93,500 sq.ft., are incorporated in the second-story framing of the building, the first story of which is of ordinary monolithic construction. Figured originally on a basis of cast-in-place construction throughout, the cost estimate of the structure was $425,000, a sum that was reduced to $335,000 by the modification involving the use of prefabricated concrete members for the second-story framework.

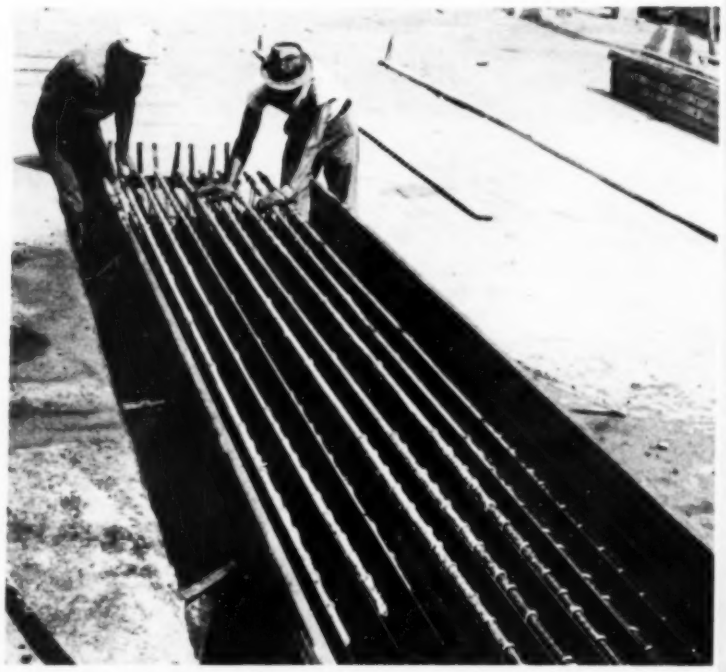
Two types of structural concrete members, ranging in length from 18 ft. 3 in. to 22 ft., are produced at the casting yard: Floor joists are 4x12 in., and strut beams, 12x16 in. in section, one strut beam being required for each seven joists. Joists weigh from 650 to 750 lb. and strut beams from 5,000 to 5,300 lb. At the yard, located near a ready-mix concrete plant from which deliveries were made by truck-mixers, casting is done in metal forms set up in groups on a raised

(Continued on page 70)

C. D. WAILES (left) and **F. J. BAGEMAN**, principals of Wailes-Bageman Co., contractors for precasting project, scan blueprint of one of 5,200-lb. precast strut-beams.



1 REINFORCING STEEL for precast units, fully assembled and with nailing strips fastened on, is carried to space behind casting machine. Each reinforcing assembly is placed on separate steel pallet ready to move, endwise, on to casting machine.

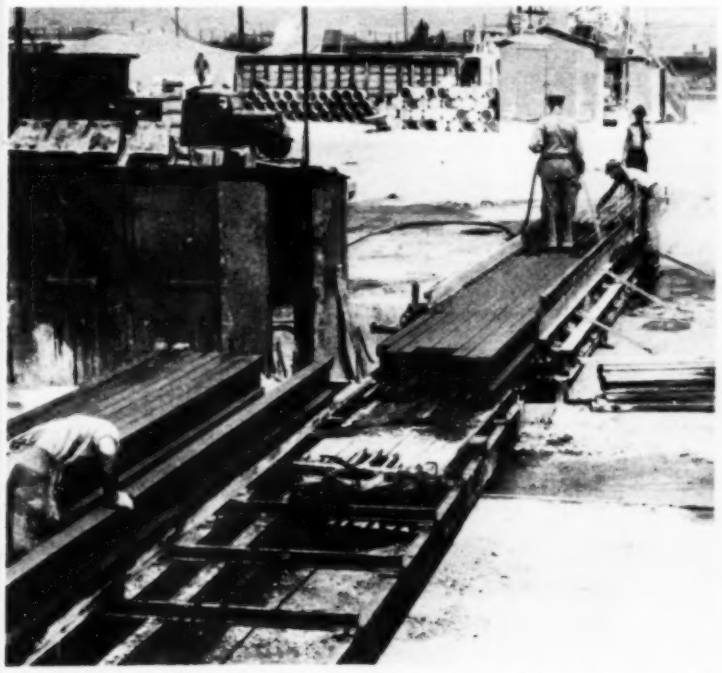


2 CASTING MACHINE TABLE is here set up for 9 floor joists. Steel reinforcing assemblies are shown moving into forms by being slid forward on their pallets.

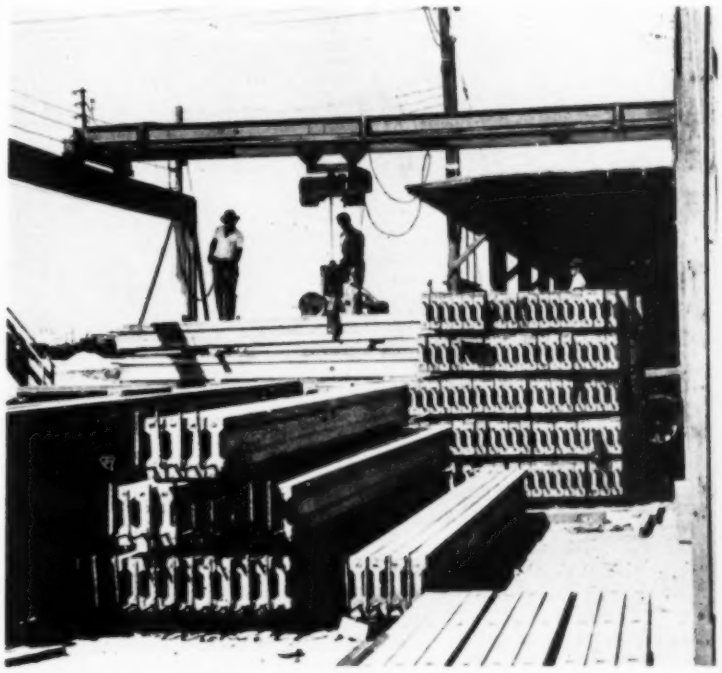
3 VERY DRY CONCRETE, chuted from a truck-mixer which has kept concrete agitated enroute from mixing plant, is spread over open form tops with hoe while truck moves slowly forward.

4 HEAVY HAMMER BLOWS, at rate of 3,000 per minute, on under side of casting machine, condense concrete and fill voids in forms. Transverse compression is effected by horizontal jacks that press form sides toward each other.

7 U-SHAPED STEEL GAGE or form, on steel strap of prescribed height, is placed on end of joist to check depth, for which tolerance is close. Best plan has been to cast joists slightly less than prescribed depth and then to trowel on grout finish.

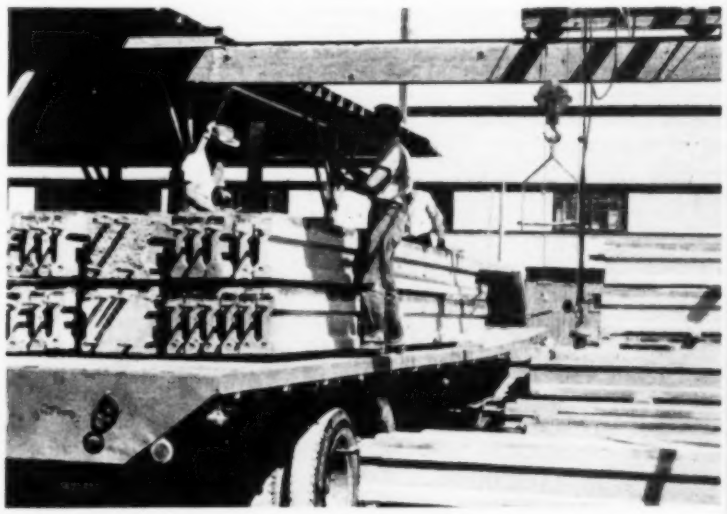


5 AFTER CASTING, side pressure is released and pallets carrying precast units are pulled forward, as group, off casting machine and on to transfer table.

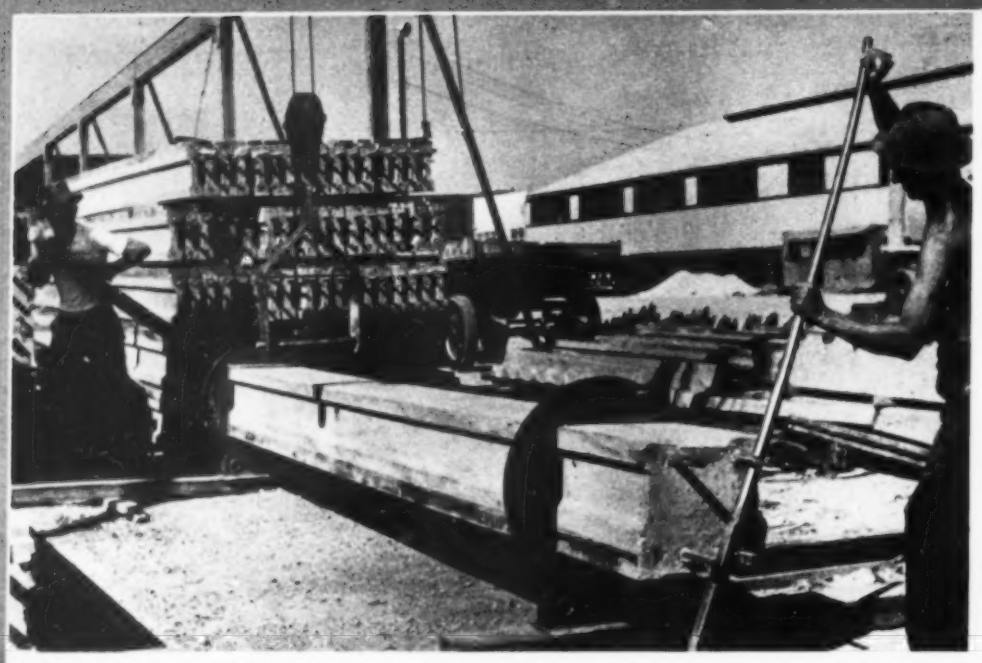


8 ALL STOCK PILING is under overhead crane between transfer table and truck-loading station.

6 ON TRANSFER TABLE units are separated only few minutes after casting, and each is sprayed with curing compound to prevent escape of moisture while concrete sets.

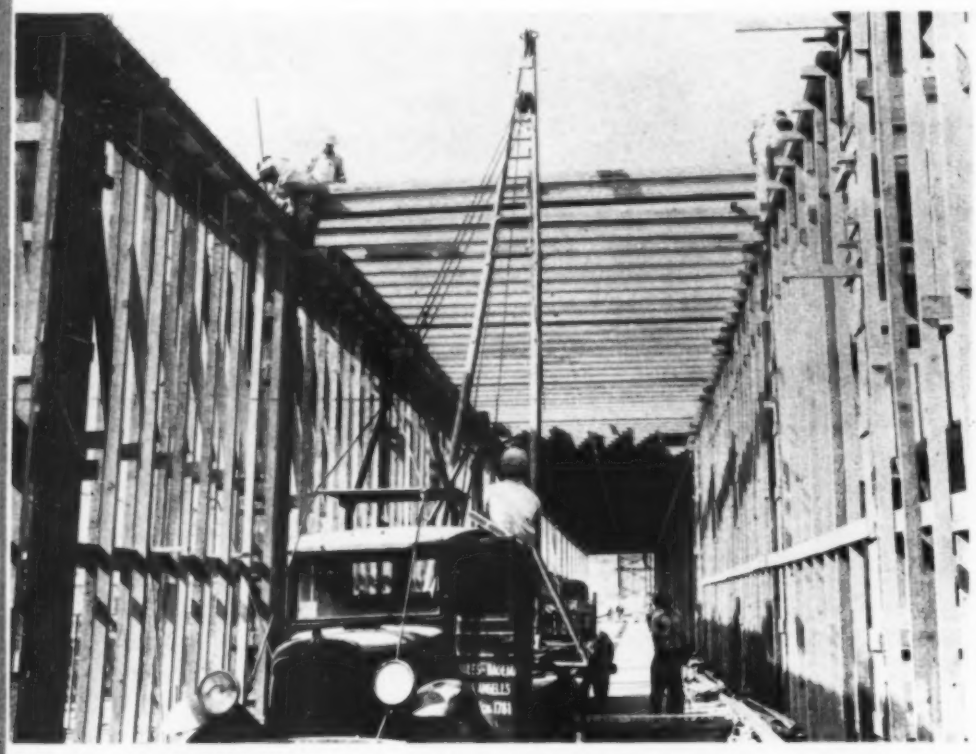


9 SEMI-TRAILER 31 ft. long hauls 17-ton truckload to job, with precast units stacked in proper order for erection.

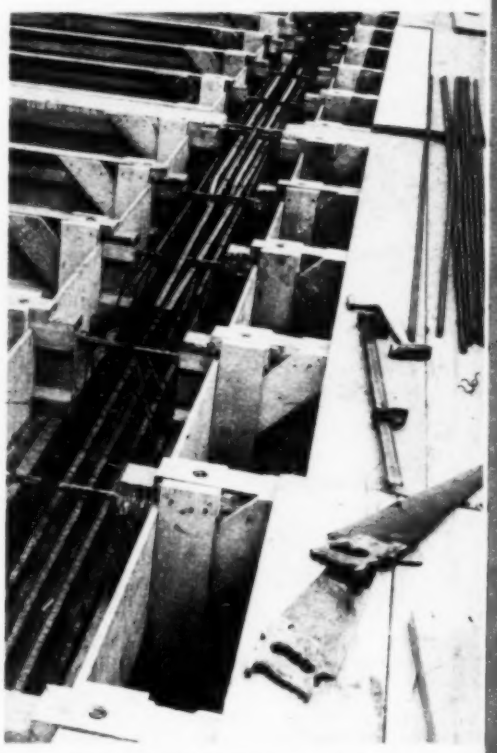


10 **PRECAST STRUT-BEAMS,** weighing up to 5,300 lb., are turned over after curing to bring to upper side wood nailing strips that were put in bottoms of forms. Pair of steel yokes on rollers under overhead crane facilitates turning.

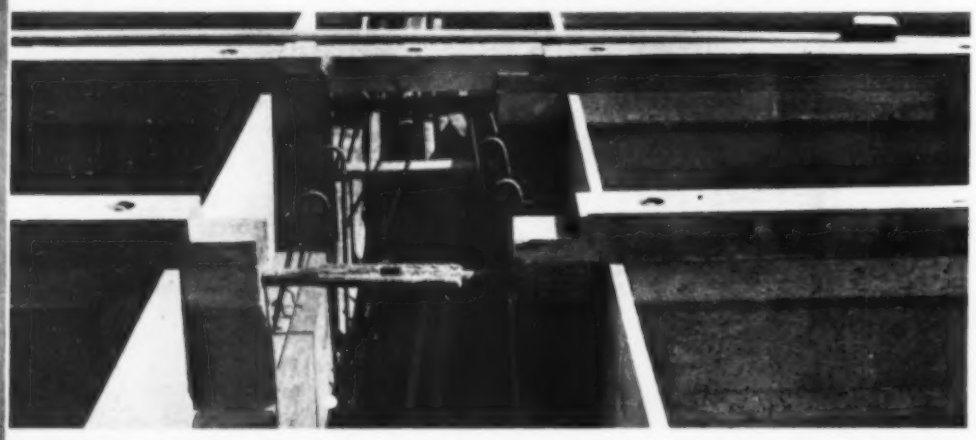
11 **FORMS ARE PREPARED** for longitudinal concrete girder. Bay at left has been cleared of braces, ready for equipment that will place precast second-floor members. In center fore-



13 **MARKS ON FALSEWORK** supporting forms for girder provide predetermined landing place for each precast unit. Usual time for placing a prefabricated joist is about 2½ min.

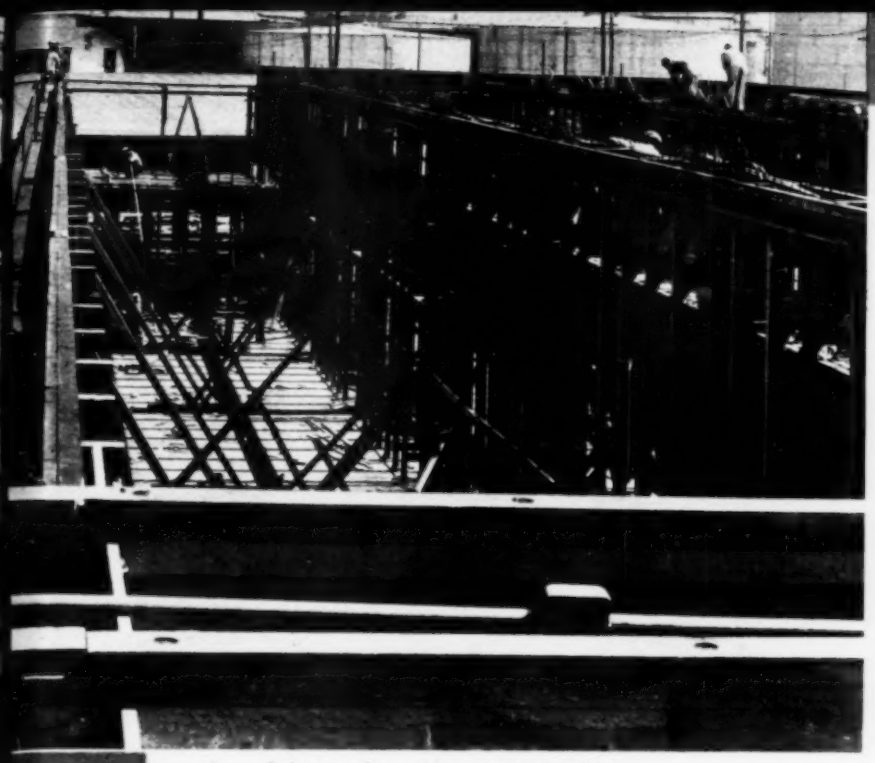


14 **STEEL REINFORCING** is set in forms for longitudinal girders, ready for concrete. Steel projects from joists, ready for welding.



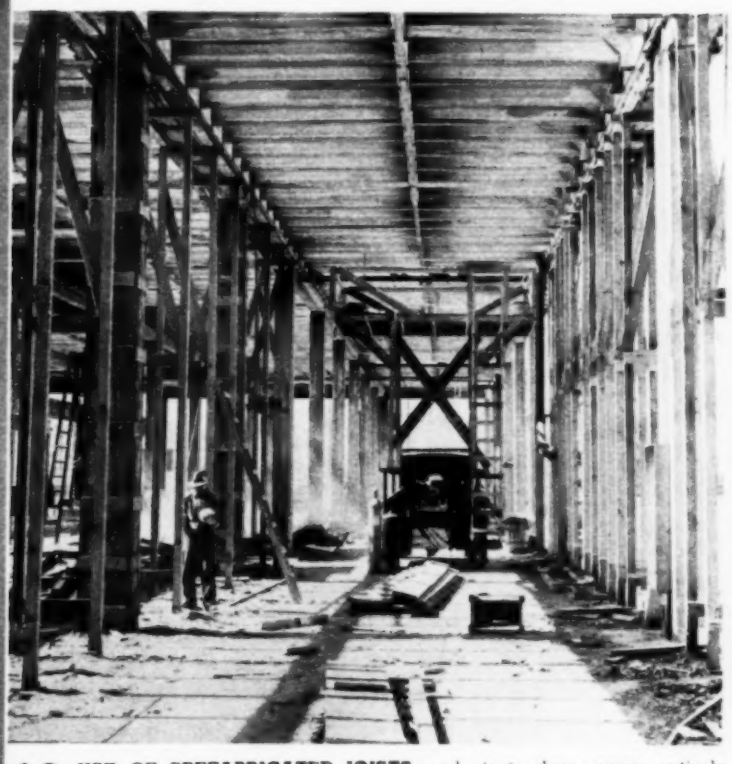
15 **IN WELDING STEEL BARS** projecting from adjacent joist ends two pieces are used at each joint to avoid torque. Concrete poured in girder forms will imbed ends of joists. Side forms for the girder are made of ¾-in. plywood fitted in between joists. Note wood nailing strips atop joists.

platform, 3 ft. wide and 30 ft. long, vibrated by motor-driven mechanism which delivers hammer blows to supporting steel I-beams on its under side at the rate of 3,000 per minute. Cages of steel reinforcement, with 3x4-in. nailing strips bolted on one edge, are placed on pallets of 4-in. steel channels which are drawn forward on the casting table to pass between vertical steel plates serving as the sides of the forms. After end forms are set in place, the assembly is ready to receive concrete, consisting of a 1:3½ mix using sand and No. 3 granite rock. A water-cement



ground are 3x4-in. nailing strips on precast joist and separate pieces later fitted in place above concrete girder form.

12 **CRANE MOUNTED ON TRUCK** and operated by truck motor, lifts precast unit to place.



16 **USE OF PREFABRICATED JOISTS** and struts does away entirely with necessity for shoring under second-floor concrete floor system. Shoring is used only under longitudinal girders. Platform mounted on truck is convenient for men working on under side of second story.

17 **HEAVY LONGITUDINAL GIRDER** below tops of columns is for crane rail. Bridging at mid-span of joists is cast-in-place in forms supported by joists. Single steel bar passes through hole in joist webs and runs lengthwise through bridging.

ratio of only 3.3 gal. per sack produces a dry mix.

After the forms receive a heaping charge of concrete they are vibrated about 3 min., the consolidating action causing the concrete to settle until the forms are only about two-thirds full. The machine is stopped, and when the forms have been replenished with concrete, vibration is resumed and the tops of the forms are screeded off to produce a smooth concrete surface. During the process of vibration, pressure is applied to the sides of the form assembly by a battery of hydraulic jacks. The resultant dense, compacted concrete weighs as much as 155 lb. per cubic foot.

When vibration has been completed the lateral pressure of the jacks is released and the pallets carrying the cast concrete members are drawn lengthwise out of the casting machine to a transfer table where a curing compound is sprayed on the freshly cast concrete. After 16 hr., the precast units are lifted by an overhead crane and stored to await transfer by truck and semi-trailer to the job site. This concrete attains a strength of more than 5,000 lb. per square inch after 7 days.

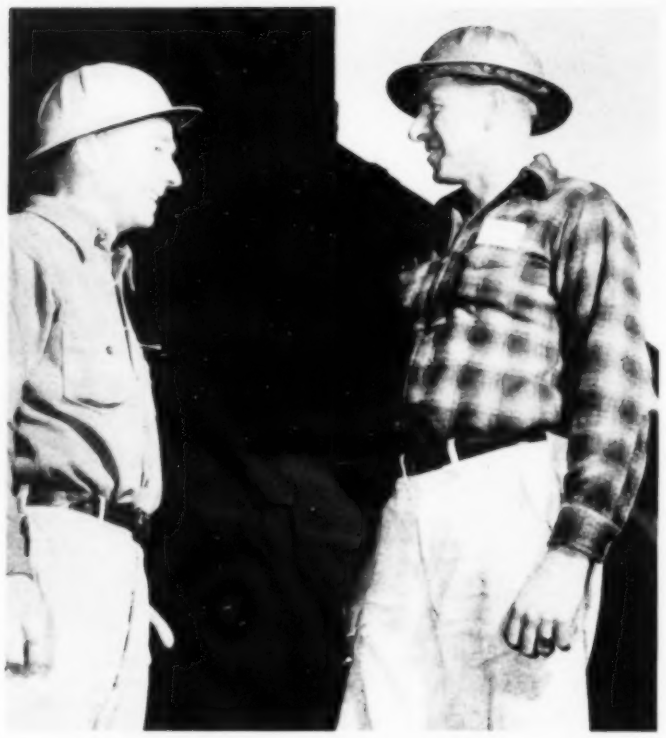
Erection of the precast joists and strut beams for the second-story framework of the warehouse and mold-loft building is handled by a crane boom and 5-ton winch mounted on a motor truck. The semi-trailer, with a 17-ton load of precast concrete joists and beams, is backed into a bay of the warehouse where bottom forms for the second-story cast-in-place girders of the structure have been set and shored. A 2x4-in. landing strip is provided, its top flush with the bottom of the tee of the girder, for receiving the precast

(Continued on page 106)

Present and Accounted For

A PAGE OF PERSONALITIES

NEW CONSTRUCTION BRANCH, headed by JOHN L. HAYNES, has been established in Civilian Allocation Division of Office of Production Management, Washington, D. C., to serve as centralized agency for handling construction supply problems, formerly dispersed among five other agencies. Mr. Haynes had previously been serving as head of lumber and building materials branch.



CONSTRUCTION VETERANS on U.S. Bureau of Reclamation's Grand Coulee Dam project in Washington are JOHN TACKE, assistant general superintendent, and M. J. ("RED") FULTON, structural steel superintendent for Consolidated Builders, Inc. Both men were on job when bedrock for foundation of 550-ft.-high dam was first exposed.

NEW DIRECTOR OF HIGHWAYS of State of Washington is BURWELL BANTZ. He was formerly engineer of Lewis County, Wash., and is past-president of Washington State Association of County Engineers.

ENGINEERING AND CONSTRUCTION PERSONNEL on newly completed Rainbow Bridge linking United States and Canada at Niagara Falls, N. Y., are congratulated at meeting of Niagara Peninsula Branch of Engineering Institute of Canada. Group clasping hands comprises (left to right): E. L. DURKEE, resident engineer, Bethlehem Steel Co. which erected 950-ft. span; A. L. McPHAIL, who presided at meeting; and SHORTRIDGE HARDESTY, of consulting firm of Waddell & Hardesty, designers of bridge.

Photo, Herb Foster

CONSTRUCTION ENGINEER (right) for Lone Star Defense Corp., B. F. Goodrich Co. subsidiary, on $35,000,000 Army ordnance plant near Texarkana, Tex., is WILLIAM B. THOMPSON, Ohio State University graduate and former chief architect and manager of industrial engineering for Goodrich organization.

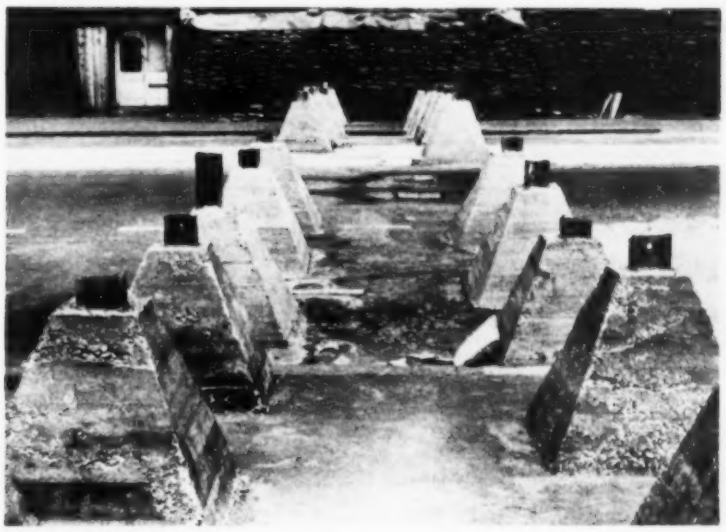
NEW PRESIDENT (left) of American Association of State Highway Officials is G. DONALD KENNEDY, state highway commissioner of Michigan. He took office at association's annual meeting in Detroit Oct. 2.

ENGLAND'S ROADS *In War Time*

SAND BAG BLOCKADE is installed across highway in southeast coast region

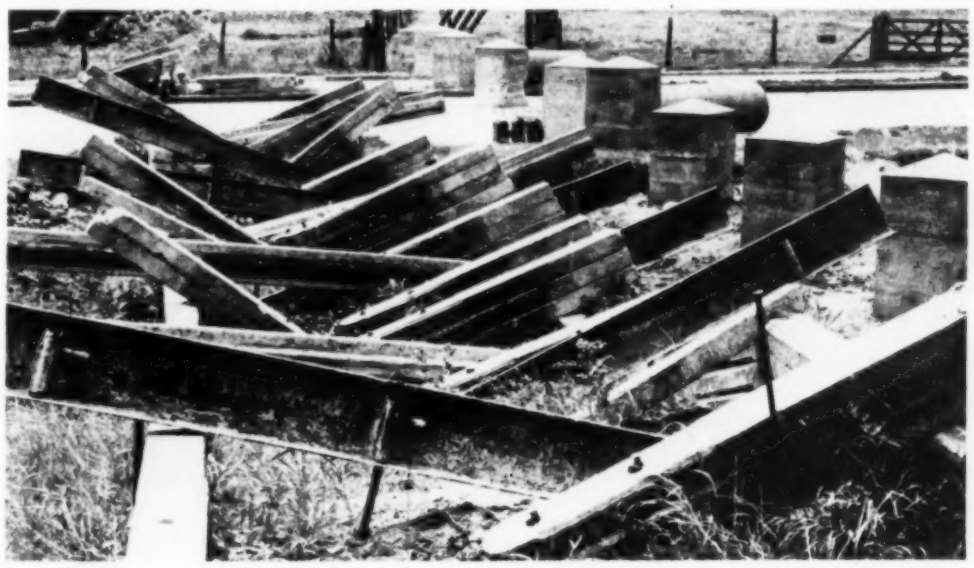
British Combine Photos

ROYAL CANADIAN ENGINEER UNIT composed of men experienced in road-building field methods uses American equipment, including Le Tourneau carryall scrapers and Caterpillar tractors, for military highway grading job somewhere in England. Capt. CAMPBELL FRASER (left) formerly division engineer of Ontario Highway Department, Canada, discusses project with Lieut.-Col. J. L. MELVILLE, of Ottawa, as Sapper BRUCE PLUMMER, of Sceptre, Saskatchewan, sits at levers of "Cat."



TO IMPEDE HOSTILE TRAFFIC in event of invasion these pyramidal concrete barriers with steel I-beam cores are built across road in southeast coastal region of England.

HOSTILE AIRCRAFT (below) are prevented from landing on English highways by these concrete pillars, designed to smash wings of plane descending to make landing. In surrounding heath, trenches are dug to accomplish same result.



ANTI-TANK TRAPS consist of lengths of steel road forms and concrete posts set at incline to stop passage of enemy mechanized equipment. Line of concrete blocks is set across road.

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CONSTRUCTION EQUIPMENT NEWS

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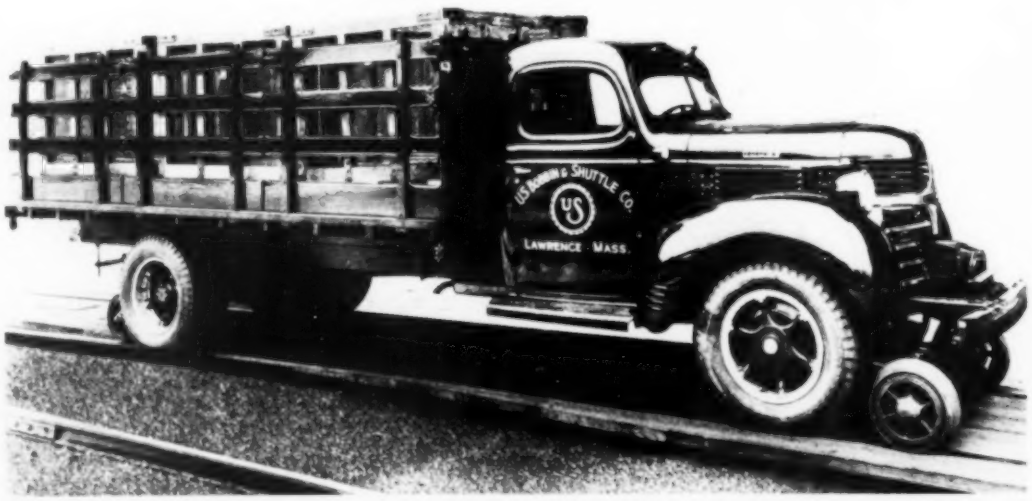
Review of Construction Machinery and Materials for DECEMBER, 1941

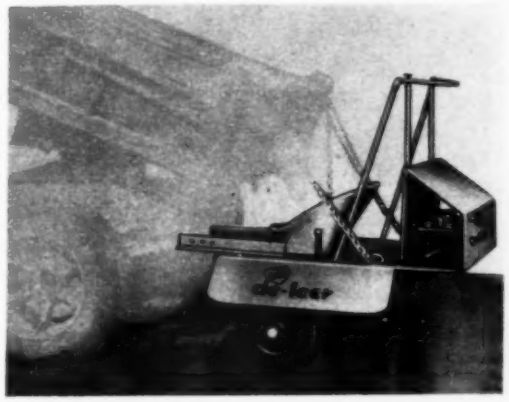
ALL-WHEEL-DRIVE POWER GRADER, said to be able to meet rigid requirements of heavy construction and all-season maintenance, including accurate finishing and grading, has power-driven wheels equipped with large diameter tires of same size for convenient interchangeability. As a result, machine can grade steeper bank and ditch slopes with longer blade and offset frame to distribute power along entire moldboard to move heavier loads. Other advantages claimed: increased maneuverability and short turning radius. Adjustments are made by hydraulic control from cab including shifting blade on arms; reversing circle; steering front and rear wheels and raising and lowering blade. When attachments are used, hydraulic power operates scarifier, loader, roller, bulldozer, snow plow and snow wing. Furnished either with diesel or gasoline power.—**Austin-Western Road Machinery Co., Aurora, Ill.**

* * *



DOUBLE-DUTY TRUCK, for operation on railroad tracks as well as on highways is equipped with Evans "Auto-Railer" steel flanged wheels which not only serve to guide vehicle, but also help to sustain load. Rear wheels of truck provide necessary traction. When not in use on railroad tracks, pilot wheels are raised by vacuum booster mechanism of truck, unit then becoming conventional road vehicle.—**Dodge Division of Chrysler Corp., Detroit, Mich.**

DUAL-DRIVE DE-ICER, for use on roads and streets and for operation with or without an engine, is claimed to be able to handle all materials at all speeds and under various operating conditions and to be low in cost and safe to handle. Features: safety lights; sand suppressor which permits oper-



ator to protect oncoming traffic; mercury automatic clutch that breaks power flow when unit is halted by such obstructions as rocks, or when engine is turned off; dual drive. Other advantages: standard tire width, adjustable deflectors, self-feeding hopper, inverted cone-type agitator. Made of boiler steel plate, electro-welded at all vital points. Weight, 550 lb. Operates from air-cooled engine, foot starter, throttle control mounted at top of safety rail. Engine engages at 800 r.p.m., precaution against gear breakage.—**Huebner Mfg. Co., manufacturer; distributor, Ace Equipment Co., Oshkosh, Wis.**

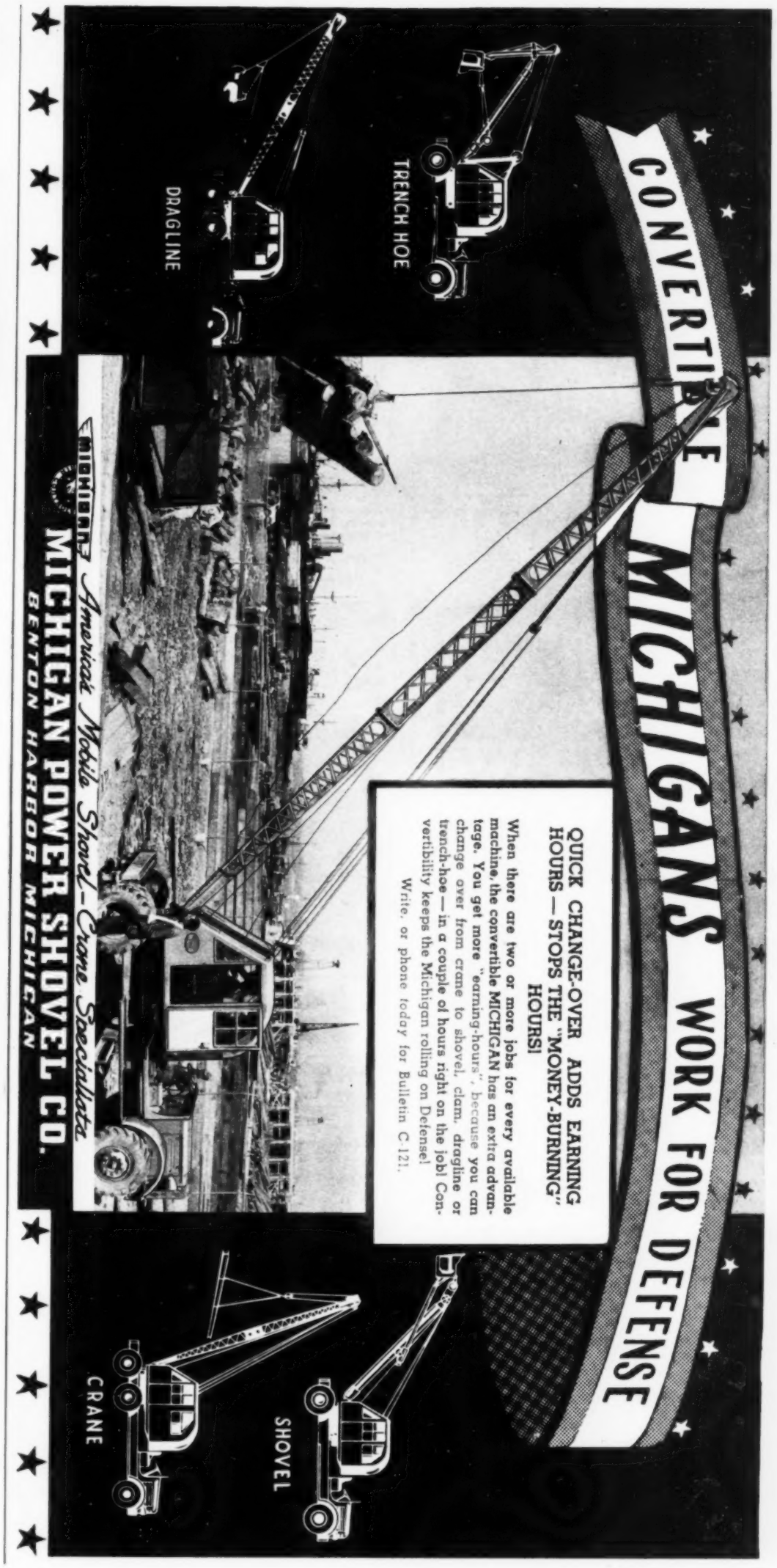
★ ★ ★

LATTICE-TYPE PILEDRIVER for attachment to Clipper crane, has 30-ft.-long heavy channel steel leads suspended from boom point sheave shaft and secured in such way that they can be quickly unhooked. Drop hammer weighs 2,000 lb., is quickly reeved and is said to respond instantaneously to

vacuum power control by which it is operated. Impact resistant pile cap guides and protects wood piles being driven. Pilot and hammer readily transported by truck. Available with 5-, 6½- or 7-ton cranes, any of which are claimed to be suitable for hoisting wood or steel piles into position for driving. All three models said to be quickly convertible to shovel or trench hoe and can be rapidly reeved for clamshell bucket or dragline operation. All operations in working cycle are vacuum controlled.—**Buckeye Traction Ditcher Co., Findlay, Ohio.**

★ ★ ★

VARIABLE SPEED TRANSMISSION (JFS-CUB), for all equipment using A belts 3.31 range, operates on conventional variable pulley principle with speed variation accomplished by shifting pulley spindle toward or away from motor and driven machine, thereby automatically changing driving ratio of variable pulleys. Positive belt aligning feature makes it possible to mount transmission in all positions without impairing its function or throwing belts out of line. Made of highest quality cast iron with



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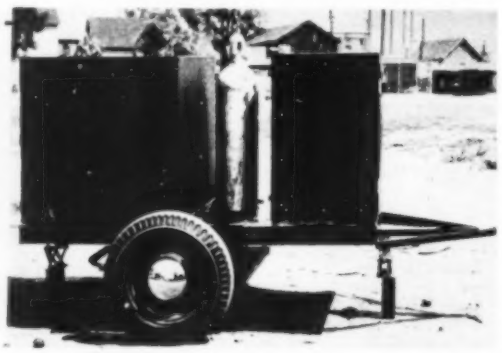
operating parts machined for smooth operation. Smooth-sided pulleys rotate on special bronze bearings provided with forced lubrication. Speed control adapted to all machines that can be driven by A-section V belts (½x11/32-in.). Speed changes may be made in 2 or 3 sec. while machine is in motion merely by shifting control lever and locking in place by turn of knob. — **Standard Transmission Equipment Co., 416 W. 8th St., Los Angeles, Calif.**

★ ★ ★

WATER PURIFICATION EQUIPMENT for swimming pools, waterworks and sewage plants called vacuum Sterelator may be installed, operated and main-



tained by local general utility personnel and is said to go about work of purifying and sterilizing water practically and economically.—**Everson Manufacturing Co., 214 W. Huron St., Chicago, Ill.**

★ ★ ★

DEFENSE "V" LIGHT, vertilateral-refractor luminaire is said to be particularly effective in protective fence lighting systems on defense projects. Main features

are deep shading-type reflector and vertilateral refractor designed to control light both vertically and laterally, thereby said to double visibility available with other lights of this type.—**General Electric Co., Schenectady, N. Y.**

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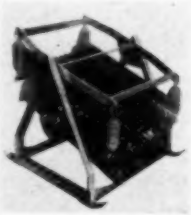

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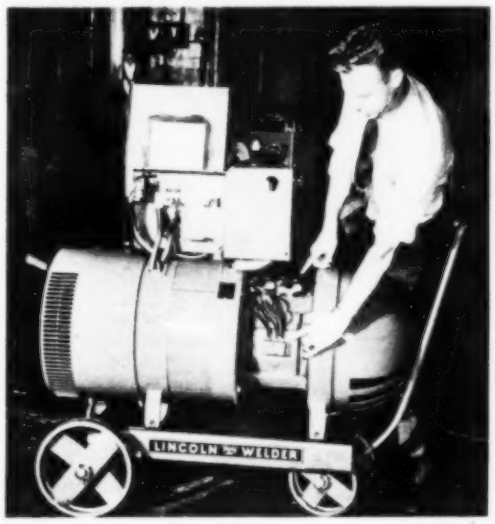
ROBINS

PROTECTIVE CONTROL DEVICE for guarding welding sets against burn-out consists of two current transformers, primaries of which are connected in series with motor leads and secondaries supplying power to operate two snap-action thermostats which are mounted directly on motor lamination. These



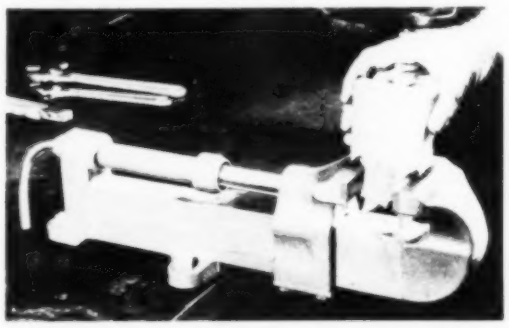
thermostats are connected to lamination in such way that they operate by means of heat conduction as well as by current passing through. They are automatically reset when motor returns to safe operating temperature or when current is reduced. No manual operations to start machine, except pushing button. By reducing danger of burn-outs, new device is said to add to serviceability, economy and long life of machine, especially at present when production welding requires continuous operation of arc-welding generators at maximum current.—**The Lincoln Electric Co., 12818 Coit Road, Cleveland, Ohio.**

★ ★ ★

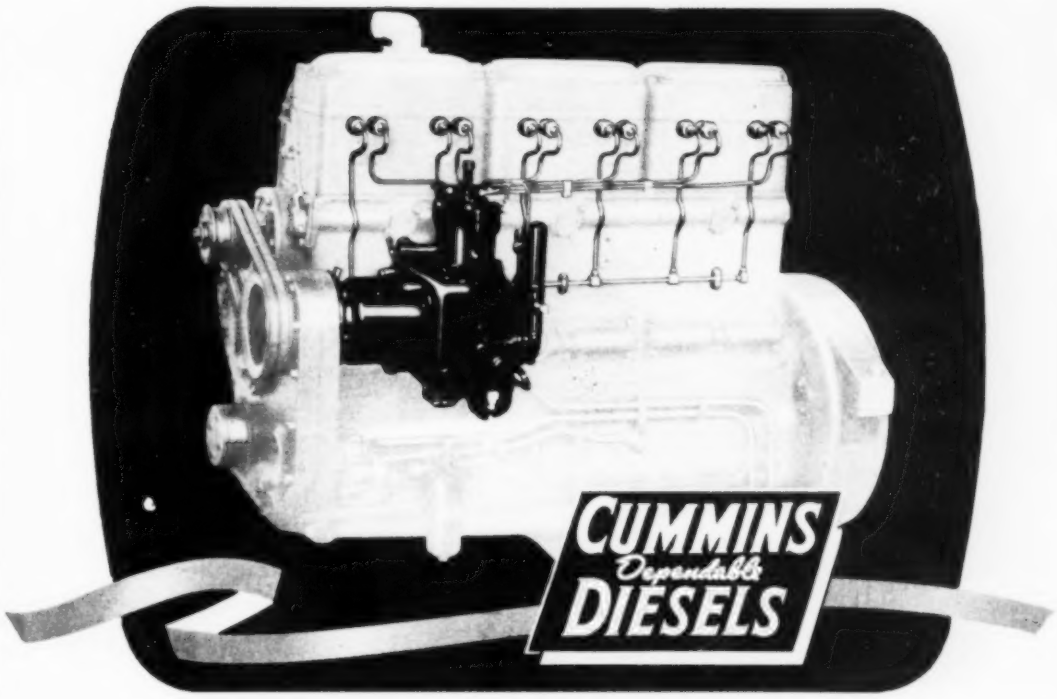
MOTOR OIL for diesel and heavy-duty gasoline engines is refined from 100 per cent Bradford, Pa., crude oil, is available in S.A.E. 10 through S.A.E. 50 grades, and is dewaxed to zero pour. To this base oil has been added special inhibitor which is said to guard against bearing corrosion, sludge formation and oil deterioration. This additive also is claimed to exhibit mild detergent action and ability to hold solid materials, such as products of incomplete fuel combustion in suspension in oil instead of allowing them to be deposited in engine. This oil is said to bring to high-speed diesel and high-output gasoline engine fields low oil consumption and minimum wear on parts—**Kendall Refining Co., Bradford, Pa.**

★ ★ ★

HYDRAULIC VISE, available in 5- and 7½-in. widths between jaws and said to be capable of developing pressures up to 5 tons, is designed to speed up small press and cutting operations as well as ordinary vise work and to be of particular value in tool rooms and for maintenance jobs. Operated entirely by foot control, permitting full use of hands in set-



ting up and removing work. Pressure to close jaws is controlled by foot pedal pump arrangement in pedestal mounted on floor, latter connected with vise proper by steel tube which carries hydraulic fluid to ram behind back jaw and thus moves it forward. Front jaw is stationary. Stepping on one pedal moves vise jaw to contact against work. Second pedal applies pressure up to 5 tons. Third pedal releases jaw. Types of work vise can perform, press work, punching, bending, cutting, straightening, testing and stamping. Vise may be mounted horizontally on any type of bench as well as vertically on wall or post.—**Studebaker Machine Co., 9 S. Clinton St., Chicago, Ill.**



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"I have been operating cranes for 10 years," writes A. G. Grupe, veteran crane operator for the Edison Fuel and Materials Co., Chicago, "and have never used a better bucket. The boss always has a big smile when he sees me come up with material spilling over the sides."

Operators and bosses all prefer Williams. Williams Welded Construction means longer wear . . . less breakage; faster work . . . more yardage! Williams buckets operate year in and year out with practically no cost for maintenance and repairs.

Distributors in all parts of the country.

Write for Free Bulletins on any of the 11 types of Williams buckets.

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WILLIAMS *Buckets*
***built by* WELLMAN**

SOMETHING BIG HAS HAPPENED TO WRENCHES

It's only logical that you're not yet "up" on all the new time-saving developments in modern Blackhawk Socket Wrenches! We say this because so many of these big developments are recent — but you can't afford to be without their advantages now that they're available. Clip and return the coupon below and get the full story in the new 48-page "Handy Guide" to Blackhawk Wrenches.

A Product of
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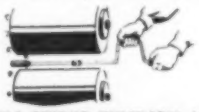
AVOID ROUNDED NUTS, SKINNED KNUCKLES. Sockets don't slip off, because they give bearing surface on all sides of the nut. ("Two-Jaw" Wrenches contact only two sides.)

GET FULL POWER ON QUICK SHORT "BITES" IN CRAMPED QUARTERS—New Blackhawk Ratchets have extra-small heads and provision for extra leverage. Big range of detachable sockets.



GET FULL-SWEEP WRENCH ACTION where short rigid wrenches would give only small pulls. Use Blackhawk Speeders, Extensions and Sockets — they all lock together.

DON'T USE BIG WRENCHES FOR LITTLE JOBS (or vice versa). Blackhawk sockets range from 3/16" to 3½" openings—with modern detachable handles of extra-utility, proper leverage and full strength.

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Please rush new Handy Guide just off the press — showing latest developments in wrenches and new use ideas.
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WRENCHES — HYDRAULIC JACKS

NEWS FROM MANUFACTURERS
About Their Products

The publications reviewed below, will keep you posted on latest developments in construction equipment and materials available for your use.

PLYWOOD—**United States Plywood Corp.**, 616 West 46th St., New York, N. Y. (31 pp., illustrated.) In addition to price and size information on woods and plywood, catalog contains an abundance of illustrations on plywood applications. Engineers, contractors and architects, it is pointed out, can use these illustrations to demonstrate to prospective customers not only conventional types of work but also numerous new applications. The Registered trademark "Weldwood" has been adopted by company to designate all plywood manufactured in its four mills. Various types of USP Weldwood products will now be designated by explanatory names, such as exterior, marine, aircraft, wallboard, deluxe wallboard. Installations pictured in catalog range from Plyscord underflooring and include applications in construction, store fixtures, residences, offices, church decoration, as well as use of architectural Weldwood in National Gallery of Art at Washington, D. C. Illustrated are flush wall installations, V joints, checkerboard and other types of paneling.

★ ★ ★

CONCRETE PAVERS—**Chain Belt Co.**, Milwaukee, Wis. (20 pp., illustrated). Bulletin 378 (1941 catalog) describes and lists specifications for Rex 34E Duomatic dual-drum paving mixer and 27E Pavemaster single-drum paver. Features of automatic, mechanical control and of paver construction are presented.

★ ★ ★

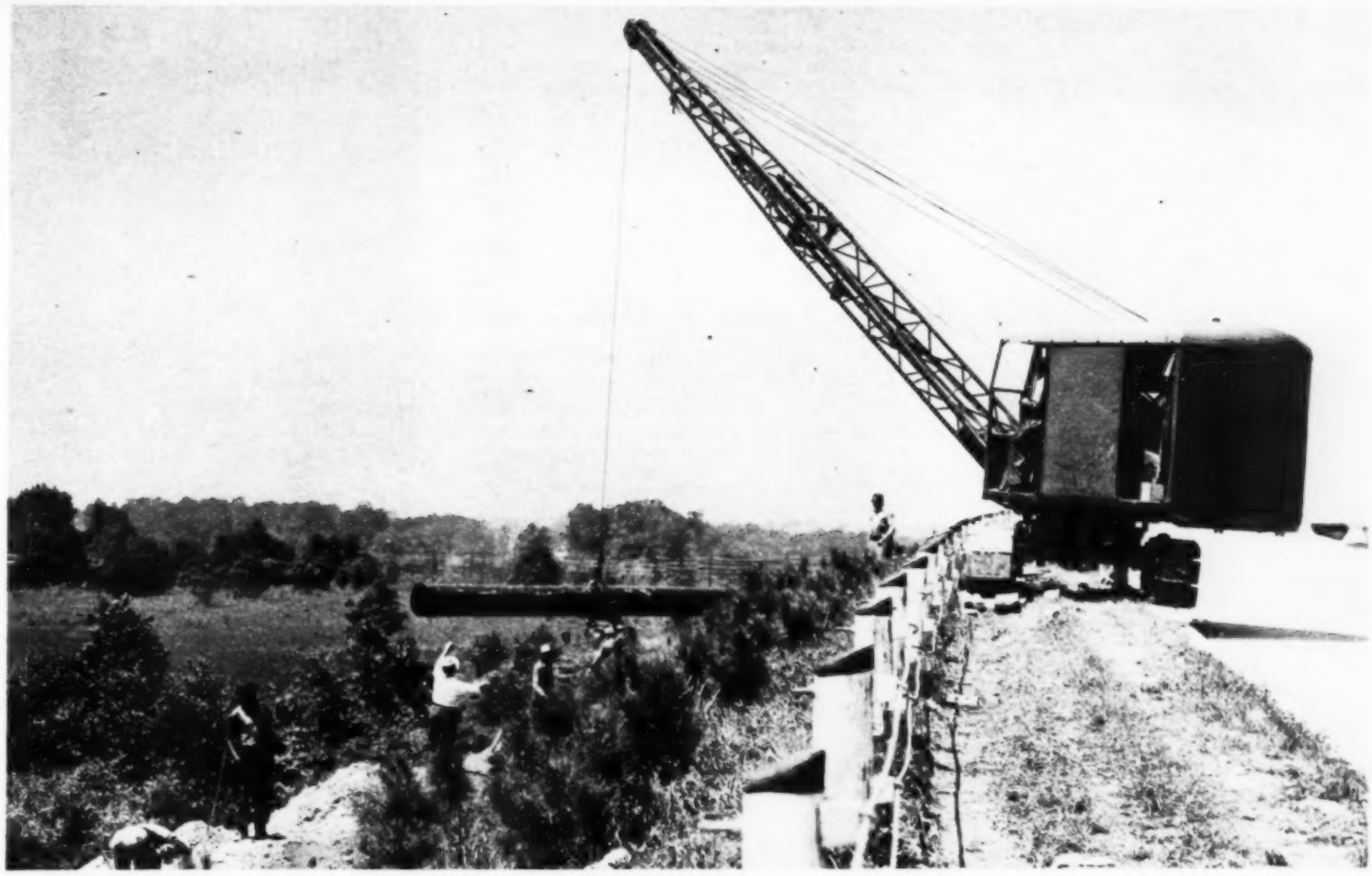
TRUCK-MIXER CHARGING PLANTS—**Heltzel Steel Form & Iron Co.**, Warren, Ohio. (16 pp., illustrated) Bulletin B-31 provides information on comprehensive line of standard plants for charging truck mixers. Units described include 30-45-ton highway bin, portable bins up to 100-ton capacity, wedge-type bolted bins to 400 tons, bulk cement tanks, portable and semi-portable bulk cement batching plants, inclosed bucket elevators, screw conveyors and belt conveyors.

★ ★ ★

CLEANING COMPOUNDS FOR GAS ENGINES—**Petroleum Solvents Corp.**, 331 Madison Ave., N. Y. (24 pp.) Discusses importance of solvents for improving operation of internal combustion engines by keeping crankcase and internal mechanism clean. Proper solvents, added when changing motor oil, are designed to prevent or minimize petroleum residues such as carbon deposits, gum, sludge, wax and varnish on valves, pistons and other engine parts.

★ ★ ★

PORTABLE AIR COMPRESSORS—**Schramm, Inc.**, West Chester, Pa. (19 pp., illustrated.) Latest edition of catalog (No. 42 P) covering in detail various types and sizes of portable gasoline and diesel engine driven portable compressors. Mountings include two-wheel and four-wheel trailer, skid and truck. Complete tables of specifications for compressors and engines. Capacities range from 85 to 420 cu.ft. of air delivered at 100 lb. per sq.in. pressure.



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Excavators everywhere are helping on the Defense program. This machine as a Clamshell digs the trench, and as a Crane lays 16" waterline for a bomber plant.

GENERAL GIVES YOU MORE!

—More reach—more stability—because size for size it's a bigger, huskier machine.

Not many ½ yard machines these days can handle their rated load on 35′ boom, out at a real working radius. This General owned by Baltimore County, Md. is doing just such a job. General owners know that THE GENERAL GIVES YOU MORE!

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Sizes: ½ to 2½ Cu. Yd.
Diesel - Oil - Gas - Electric
Associated with The GENERAL EXCAVATOR CO.

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HERCULES *IRONEROLLERS*
6 to 12 Tons
Diesel or Gasoline
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OSGOOD MARION OHIO U.S.A. GENERAL HERCULES
Sizes: ⅜-½-⅝-¾ Cu. Yd.
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SHOVELS
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Crawler & Wheel Mounted
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DIG AT TOP SPEED...

These Plates Keep Up!

According to the engineers, lining this outfall sewer tunnel with ARMCO Plates was about 50% faster than timbering. Local unskilled labor did the work, tunneling beneath a railroad and highway without stopping traffic.

• Fast tunneling is no trick with ARMCO Liner Plates. Even inexperienced crews can install them quickly and economically. One man easily handles the strong, light weight metal sections, bolting them together with ordinary wrenches. Work moves fast and costs are low.

On a strength-weight basis ARMCO Plates cost less than any four-flanged type. In many cases you actually buy fewer ARMCO plates because their great strength permits the use of alternate rings in partially self-supporting ground. You'll save even more by ordering ARMCO Plates to fit the job. There's a type and gage to meet every condition. Excess weight is out.

Try ARMCO Liner Plates on your next tunnel. Other contractors and engineers find them a big help in "holing through" ahead of schedule and under the estimate. Write for prices and complete facts. ARMCO DRAINAGE PRODUCTS ASSOCIATION, 50108 Curtis Street, Middletown, Ohio.

ARMCO

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TUNNEL LINER PLATES

NEW WHEEL TRACTOR—**Caterpillar Tractor Co.**, Peoria, Ill. (Broadside, illustrated.) Heavy-duty, high-speed diesel-powered hauling unit (Model DW10) equipped with pneumatic-tired wheels for operation with bottom-dump wagons and cable-controlled scrapers. Six-cylinder engine is 98-hp. diesel. Outstanding design or operating features include ability to make reverse turn on 26-ft.-wide fill, weight distribution to produce exceptional pulling ability, five forward speeds (2.4 to 18.1 m.p.h.) coil-spring cushioned seat for operator, and high ground clearance.

★ ★ ★

WIRE ROPE—**Hazard Wire Rope Division, American Chain & Cable Co., Inc.** Wilkes-Barre, Pa. (19 pp., illustrated.) Largely a booklet of specifications indicating proper wire rope to use on all operating parts of construction equipment and other machines or services. Advantages cited for preformed wire rope, including ease of handling, non-kinking properties, freedom from internal stress and resistance to bending fatigue. Recommendations for hoist, boom, crowd pull, holding, closing and other lines on power shovels, ditchers, carrying scrapers, draglines, dredges, cranes and derricks. Hints on selection and use of wire rope slings. Useful data in tabulated form covers size and type of wire rope recommended for wide range of construction equipment.

★ ★ ★

Diamond Drilling Practice Developed at Grand Coulee

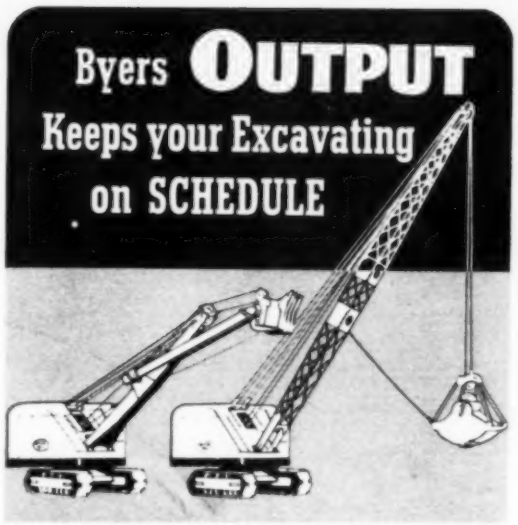
(Continued from page 66)

Good, gritty granite or garnetite is considered good rock for shaping and breaking in carbons. Basalt is said to prove a stone, but not to shape it as readily. Due to the cooling cracks present in basalt flows, a bit in this rock is subject to sudden shock which may break the carbon if flaws or fractures are present. Usually the better shape a stone has the softer it is. Likewise, the reverse is true. It is not unusual to lose 20 per cent by weight of a stone in shaping during drilling. Bits set with sharp-cornered stones will cut faster, but the carbon loss mounts very rapidly. This rise in carbon loss is sometimes offset by decreasing labor costs due to more footage per shift.

Savings With Small White Diamonds

Black diamonds, the only stones originally used for drilling, are still preferred for drills to be used on various kinds of material. Prices for these stones range from $75 to $100 per carat; frequently they are used in sizes of 2 carats and larger. While drills set with these large, black stones are expected to make cores through "anything," where the ground is uniformly hard it has been found in recent years that small white gems (bortz), which can be bought as low as $3.50 per

Byers OUTPUT Keeps your Excavating on SCHEDULE



● All Byers excavators are well known for their ability to get maximum yardage every day. With Byers shovels, it's the snappy, accurately controlled independent chain or cable crowd that does it. With Byers cranes it's their ability to swing while traveling.

This is another reason why you should investigate Byers.

11 FULLY CONVERTIBLE MODELS IN 3/8-1/2-5/8-3/4 YD. SIZES

Modern CRANES and SHOVELS

BYERS

RAVENNA, OHIO

"Going Good

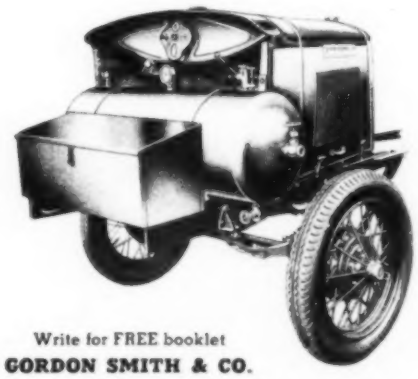
and making GOOD MONEY for us",

says W. C. White & Son, Dayton, Ohio about their

SMITH AIR COMPRESSORS

RIGHT NOW, think of the savings you'll enjoy with these lightweight, sturdy compressors! BIG savings in purchase cost over standard compressors of equal capacity . . . important savings on upkeep too! Made with FORD Motors and standard parts. That means dependability and economy. Repairs and parts at Ford garages everywhere. . . In service, 60 cu. ft. size Smith Compressors use only 1 gal. of gasoline an hour! Easily portable tow them from job to job at permissible truck speeds. No couplings, belt, clutch or gears to wear and give trouble. Head equipped with high speed compressor valves; automatic unloading and idling. . . Write today for complete catalog that gives you the facts!

With a Ford Motor and shop facilities you can assemble your own Smith Compressor. We will furnish a Smith Compressor Head and Accessories with complete instructions for mounting.



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480 College St., Bowling Green, Ky.

VULCAN

PILE HAMMERS

FOR SPEED AND COST SAVINGS IN today's CONSTRUCTION

★ **Super-Vulcan Differential-Acting Closed-Type Steam Pile Hammers, 1800—3000—5000—8000 — working parts are totally enclosed. Overall length reduced to save head room, to permit underwater work.**

Super-Vulcan Differential-Acting Open-Type Pile Hammers, 18C—30C—50C—80C—use 25 to 35 per cent less steam per blow—give twice the number of blows per minute — drive more piles per dollar. Simple design, positive action, easy to operate.

Warrington-Vulcan Single-Acting Steam Pile Hammers deliver a moderate frequency of low velocity blows from a relatively heavy ram.

Vulcan Pile Extractors for pulling sheet steel, wood, concrete, H-beams, and pipe piles. Compact — dependable — efficient —rapid in performance.

Write for details.

VULCAN IRON WORKS Since 1852

331 North Bell Avenue

Chicago Illinois

carat, will cut speedily and often very economically. These stones are used in quite small sizes, from 1/6 down to 1/8 or 1/10 carat in weight. Cutting qualities of bits set in this way are reported as less reliable than for bits equipped with the large black diamonds. Bits set with the small diamonds are best suited to unbroken ground, where no sudden shocks are likely. Sound, dense basalt, for example, may be drilled with a bortz bit, and when the interflow zones are reached a change to a carbon bit is made.

Records of performance of the diamonds used at Grand Coulee, and a check on the weight and value of the stock on hand, are made with the aid of precision scales. Diamonds that go into each bit are weighed before mounting and after dismantling.

In preparing to set a bit, diamonds are selected that will be best suited to the kind of rock to be cored. The diamond setter tries to place each stone so that a corner will project just the right amount and at just the right angle beyond the metal of the bit. Usually the projection is about 1/64 in. beyond the metal. If the corner is too sharp, there is danger of breaking off. Long experience in diamond setting and even a knowledge of the peculiarities of individual stones is necessary to best results. The men become accustomed to the characteristics of individual stones and have names for many of them. The preferred setting is one in which the projection will be of globular shape. In the smaller bits where perhaps four large stones (1¾ to 2¼ carats each) may be set around the outer periphery, and a similar number on the inner periphery; smaller diamonds or "chips" are sometimes set in between.

Settings for Various Drill Sizes

Each stone of importance has its own drill size, which may range from a No. 60 drill up to one of ¼-in. diameter. In the 6- and 10-in. bits, as much as 45 carats in weight of stones may be used, with individual bortz stones set as little as 1/16 in. apart and carbons less than ⅛ in. apart. Frequently these settings are in three rings, one on the outer periphery, one on the inner periphery, and one along the center line of the steel, in between the inner and outer rows. For these large bits, the steel is usually ¼ in. thick. All bit steel is of a soft grade like Swedish steel, low in carbon, and malleable to a high degree. An important consideration is to have a uniform steel in which there are no hard spots. This is because of the difficulty of calking anything but the soft steel, and the importance of getting a uniformly calked setting for each stone.

To obtain the firm and uniform imbedment desired, copper is sometimes used as a matrix under or around the base of the stone. On the bits of large diameter, the time required for an expert to set the diamonds is about 2½ days.

The drill rigs themselves are arranged for convenience in portability, because frequent moves are necessary. Usually the equipment is such as can be quickly dis-

(Continued on page 82)

JAEGER, ALONE, Gives You All These Pumping Features

JAEGER "PRIMING JET" — Up to 5 times faster priming and re-priming — often means difference between profit and loss on job. No adjustments — no need to "gun" engine.

POSITIVE RECIRCULATION CUT-OFF — It's controlled by flow, not pressure.

HI-HEAD, HI-CAPACITY IMPELLER efficient under wider range of performance (built of steel in 4" to 8" sizes).

PATENTED "LONG LIFE" SEAL — accessible for inspection.

PATENTED SELF-CLEANING SHELL — scours while pumping, won't clog, easily accessible.

DEPENDABLE, LONG LIFE CONSTRUCTION — thousands of EXTRA hours of service.

EVERY PUMP INDIVIDUALLY TESTED for capacity and pressure before it leaves our factory.

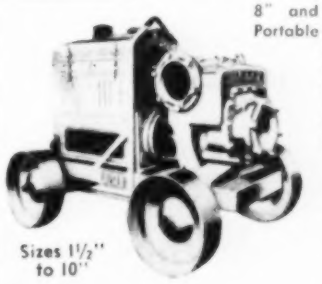
Weighs Only 52 lbs. — 3000 Gallon Bantam Pump!

Send for Prices and New Catalog Describing Complete Line of World's Champion Sure Prime Pumps:

Compact 2", 3", 4" and 6" Sizes — Heavy Duty and Intermediate Types.

8" and 10" Sizes, Most Portable Big Pumps on Market — Capacities to 240,000 G.P.H.

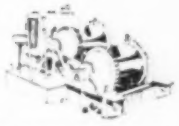
Convertible Jetting - Dewatering Pumps (Two Pumps in One). Vertical Caisson Pumps, Well Point Systems, Triplex Road Pumps.



Sizes 1½" to 10"

MIXERS Tilting, Non-Tilt, 3½S to 56S

HOISTS 6 to 100 H.P.



THE JAEGER MACHINE CO.

800 Dublin Ave., Columbus, Ohio

IN THE SPOTLIGHT

Exclusive Features of "Ames" Solid Shank Shovels

1 The blade and socket made from one solid piece of steel.
2 The Shock Band which adds substantially to the handle strength.
3 All grades heat treated.
4 Labels die pressed into wood in two colors.
5 D Handle shovel equipped with the famous ABW Armor-D Handle.

Add to these features the quality of the steel and the second growth Northern Ash handles and you have a shovel that is *tough!*

Ask your Jobber

"AMES" PRODUCTS
SHOVELS . . . SPADES
SCOOPS . . . FORKS
HOES . . . RAKES
POST HOLE DIGGERS
AGRICULTURAL HANDLES

AMES Since 1774

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PARKERSBURG, W. VA. NORTH EASTON, MASS.

Constructed for Greater Comfort!

GOODALL "Toe-Saver" BOOTS

Real comfort, long wear and safety are characteristics that have made "Toe-Savers" the favorite of both buyer and wearer on every kind of job requiring boots. A flat last, ample ventilation and plenty of toe-room, make "Toe-Savers" extremely easy on the feet. Finest quality materials and exclusive reinforcement features insure utmost economy through longer service. Patented built-in steel toe-cap and "Wear King" tire-traction cross-ribbed sole, provide an unequalled degree of safety. In other words, GOODALL'S "Balanced-Built" construction gives you

"LONGER WEAR IN EVERY PAIR"

. . . and Lower Boot Bills!

Styles: Short, Three-Quarter, Full Hip, Bootees. Sizes: 6-12, incl.

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Mills: Trenton, N. J. *Branches and Distributors from Coast to Coast* *Est. 1873*

GOODALL RUBBER CO., Inc.
36th and Market Sts.,
Philadelphia, Pa.
Please send copy of your workmen's BOOT and CLOTHING CATALOG, describing 150 styles.

Company.....
Address.....
City and State.....
Att. of.....*Title*.....

(Continued from page 81)

mantled into parts of a size that crew members can load on to a motor truck. A light automobile engine is frequently used for power to operate the drill in field set-ups. The drive-shaft works through a gear box that will give a drill rotation from 100 to 900 r.p.m. However, diamond drill speeds are rated differently from other drill operations.

Rates of Drill Feed

In diamond drilling the bit speed is defined in revolutions per inch of bit advance. By changing the gear ratios in the swivel head, speeds from 100 to 900 revolutions per inch are available. Whether this inch of advance requires 2 min. or 15 min. depends upon hardness of the rock, sharpness of the bit, and whether the main purpose is 100 per cent core recovery or hole footage. Drillers learn from experience the rates of feed best suited to various situations and changes are made frequently. Vibration and other actions of the drill rig give indications as to the best feeds to use. The per cent of core recovered on this job is ascribed largely to the skill of the driller.

Hollow drill rod comes in 10-ft. lengths, but for much of the Bureau work overhead supports are made high enough to take two of these lengths, thus decreasing the time lost in changing bits or pulling rods to recover core from the barrel. When the drill rod is lifted from the hole, the bit and the adjacent rod sections containing the core sleeve are placed on a conveniently shaped support while the bit is removed with a wrench. The core sleeve is then taken out of the lower end of the drill rod. The core sections drop out as the sleeve is tapped with a block of wood.

Because the action of any individual drill will vary in different materials, close teamwork is necessary between diamond setter and driller. To obtain maximum efficiency in different formations, nine different styles of setting the diamonds, each suited to a different rock formation, are used by the Bureau diamond setters. In short, there are nine styles of settings in the "bag of tricks" from which the driller may select.

If he selects wisely, his bit may go down 2 ft., 12 ft., 20 ft., or possibly 240 ft. before replacement is required. Then again some unexpected development may necessitate a bit change after only, say, 6 ft. of drilling. This, despite the fact that some of the men in the Grand Coulee crews have been working with diamond drills for 25 years. In other words, even the best diamond drills are temperamental and require a sixth sense in effective handling.

Drilling Progress

In good sound rock for holes less than 300 ft. deep, it is not uncommon to drill 30 ft. per shift. These figures are for a hole of AX size ($1\frac{15}{16}$-in. hole; $1\frac{5}{16}$-in. core). Increasing the size of hole to BX ($2\frac{23}{64}$-in. hole; $1\frac{41}{64}$-in. core) may cause the footage to decrease to 20 ft. per shift. Many factors influence progress. If the hole is deep, less time is spent actually

(Continued on page 84)

GULF LUBRICANTS

are a big help on a tough job like this"

. . . says Contractor on Mountain Highway Project

"Thanks to Gulf Quality Oils and Greases, we're getting efficient, low-cost performance from our equipment."

"WE'VE learned from experience that proper lubrication with tough-filmed Gulf lubricants plays an important part in the rapid completion of a contract," says contractor on mountain road project. "On a job like this, for example, our equipment gets full protection under the most punishing conditions. Result: We avoid costly delays from mechanical failures, and secure efficient, low-cost performance."

If you want the same efficient operating record this contractor enjoys, here's the way to get it: Ask a Gulf engineer to recommend the right lubricant for each piece of equipment your are using. His recommendations are based on thorough training and practical experience in the field.

GULF

Gulf quality lubricants are quickly available to you through more than 1200 warehouses in 30 states from Maine to New Mexico. Write or 'phone your nearest Gulf office today.

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Smith 56-S Tilting Mixer installed in Jahncke Ready-Mixed Concrete Plant, New Orleans.

Jahncke Ready-Mixed Concrete Company's four new No. 2 Smith-Mobile Truck Mixers.

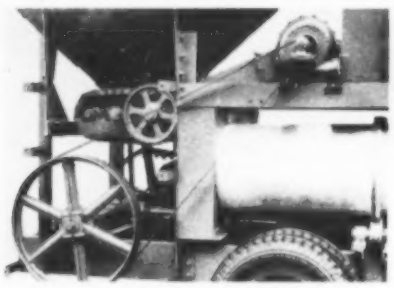
Dependability COUNTS!

Old Smith Tilter Customer Orders Fleet of 4 SMITH-MOBILES

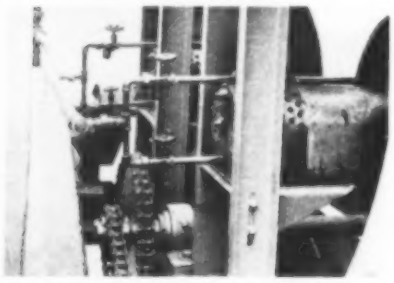
The Jahncke Ready-Mixed Concrete Co., New Orleans, recently purchased four Smith-Mobile Truck Mixers. Why? Because they liked the HIGH DISCHARGE—the handy FEED CHUTE—the VISIBLE MIXING feature? Yes, but primarily because of the excellent, all-around performance of the Smith Tilting Mixers which Jahncke has been using for many years.

Jahncke knew that Smith-Mobiles were designed, built and guaranteed by the same company that built the famous Big Smith Tilters . . . knew also that Smith Engineers had a reputation at stake. They wouldn't dare put out an inferior product. No doubt about it, you can buy Smith-Mobiles with confidence . . . hundreds are now in successful operation . . . so why gamble with new, untried truck mixers?

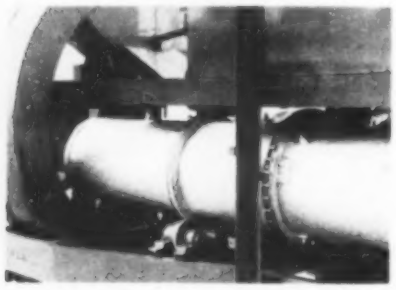
THE T. L. SMITH COMPANY
2851 N. 32nd St., Milwaukee, Wis.



1 Two 13'6" oil fired rotary driers, one for sand and one for aggregates.



2 Oil and water don't mix — thorough heating drives off moisture, leaving sand and aggregates thirsty to absorb bituminous material.



3 Rotavator starts mixing of sand and aggregates as it elevates them to the screw pug mill where hot asphalt is introduced. Pug mill finishes mixing.

Better Asphalt at Lower Cost!

THAT'S no idle boast — it's a fact. Users report asphalt mixes of superior quality at a surprisingly low cost per yard from their Universal "Twin Dryer" Portable Asphalt Plants. Does everything that a regular stationary asphalt plant does, but with drying and mixing processes greatly simplified.

The "Twin Dryer" produces up to 42 tons per hour of asphaltic concrete, wearing course mixes or hot patch material. It's a "priority" machine for fast, low cost paving of airport runways and a cost-cutter for municipal street maintenance. Send for the full facts!

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UNIVERSAL
CRUSHERS, PULVERIZERS, COMPLETE PLANTS, SPREADER-ROLLERS, PORTABLE ASPHALT PLANTS

(Continued from page 82)

drilling and more in pulling rods to recover core. The longest core barrels used on this job are 10 ft. in length. Core barrels 5, 3, 2 and 1 ft. long are also used.

After drilling concrete cores, which is the only use made at Grand Coulee of the 6 and 10-in. core drills, steel wedges are put down to break off the core when the hole is finished. Most frequently, concrete cores are taken to show the bond at construction joints. For this purpose, only short cores are required, say, 2 to 3 ft. long. However, concrete cores up to 7 ft. have been taken in the 6-in. diameter, and a total of some 15,000 ft. of concrete core drilling has been done. In drilling through steel reinforcement, there is considerable risk to the stones, not because of hardness of the steel but because of danger that the steel may get loose in the concrete as the cutting goes on and in so doing may wedge in such a way as to dislodge some of the diamonds.

Size of Drill Crews

When the drills are wash boring, (driving casing through overburden to bedrock before actual diamond drilling starts) the crew consists of 3 men, one driller and two helpers. The helpers (1) Turn the chopping bit and rods while chopping; (2) turn the casing when it is being driven; (3) prepare casing for the hole (clean and grease threads and measure); (4) keep water pump serviced; (5) keep rig oiled and clean; (6) keep tools in order—"keep house". When drilling, the crew consists of driller and one helper. The helper's duties are then the same as above with the exception of the first two operations which are no longer being performed.

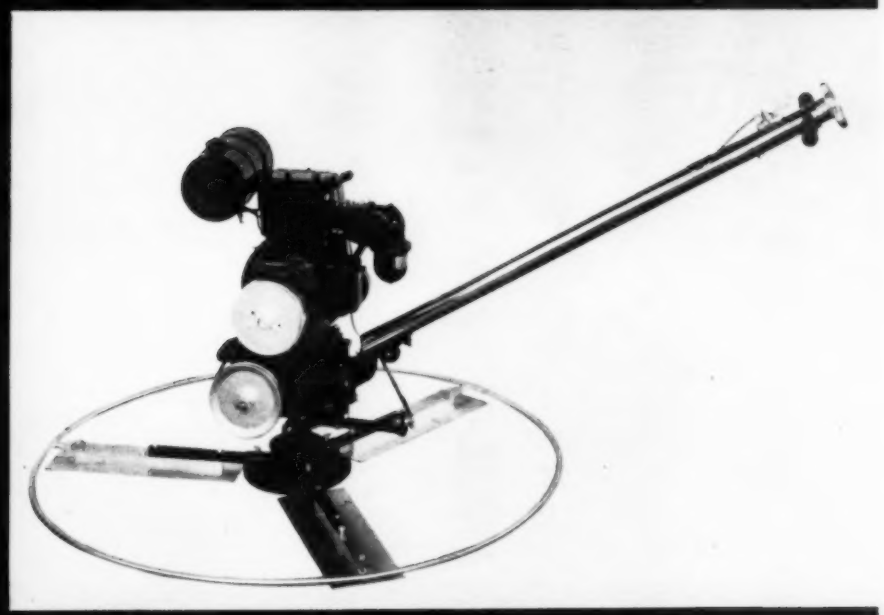
Deep Core Drilling

In addition to core-drilling operations of the Bureau, the general contractors at Grand Coulee, Consolidated Builders, Inc., have carried on core drilling, totaling more than 100,000 ft., under a subcontract held by Lynch Brothers. The latter firm, whose drilling has been largely in making grout or drainage holes (in contrast with exploratory work done by the Bureau) has included in its operations about a dozen holes that are 500 ft. deep. In these deep borings, cores and drill rod can be removed in about 45 min. In their smaller drills, this firm makes extensive use of stones that range from 6 to 10 per carat. As many as 150 of these may be used in a single bit, placed in a bronze compound face of relatively low melting point. These bits are not reset on the job. The Bureau diamond drilling, on the other hand, is all done with hand-set bits on which maintenance and reconstruction is all done right on the job.

The total number of the Bureau's diamond drill men in shop and field for the entire project is about 50. This ordinarily includes three drill crews, which are kept in the field. These men are all employees of the U.S. Bureau of Reclamation; S. O. Harper, chief engineer, Denver, and Frank A. Banks, supervising engineer, Grand Coulee Dam.

Here's SPEED *and* PROTECTION
for Cement Floor Finishing

Covers
1,000 square feet
of
Cement Floor
in
15 Minutes!



WHITEMAN Precision Cement Floor Finisher — Gasoline Model. Also available with Electric Drive.

ON construction projects all over the country the WHITEMAN machine finisher has produced better, harder cement floors, more quickly, at lower cost. Contractors everywhere testify to its PROVED performance—its ability to pay for itself in a remarkably short time.

SPEED

The rotating, adjustable pitch, steel trowels of the WHITEMAN Finisher will cover 1,000 sq. ft. in as little as 15 minutes—produce flatter, smoother floors in half the time. Large areas can be handled quickly. Finishing crews work faster, because the machine eliminates slow, tedious, back-breaking labor.

PROTECTION

The WHITEMAN Machine Finisher protects you against bad weather — rain on an unsheltered pour—a boiling sun. In many instances where hand finishers couldn't save the floor, the WHITEMAN machines brought the finish up and produced a hard finished surface.

This machine is real insurance against having floors "get away from you" when extra finishers are not available.

You avoid unnecessary costly "overtime" expense on large areas, with this *faster* machine finisher.

The WHITEMAN Finisher protects you against a shortage of skilled labor, for it operates simply and easily.

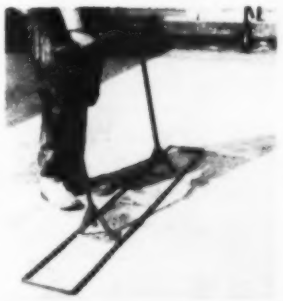
For a harder, denser surface, use the WHITEMAN Cement Floor Finisher. The weight of the machine compacts the mix and produces uniform distribution of the aggregate right up to the wearing surface. Its steel trowels produce an absolutely level floor without laitance or voids.

See it in action! Your nearest distributor will gladly demonstrate its faster performance and cost-saving features.

"WHITEMAN" Hand Grill Tamper
makes Dense, Hard Floors Without Dry Topping

Dry topping is unnecessary with a good concrete mix, when you prepare the slab with this Hand Grill Tamper. The "WHITEMAN" Tamper knocks heavier aggregates down — leaves a "fat" sufficient for finish.

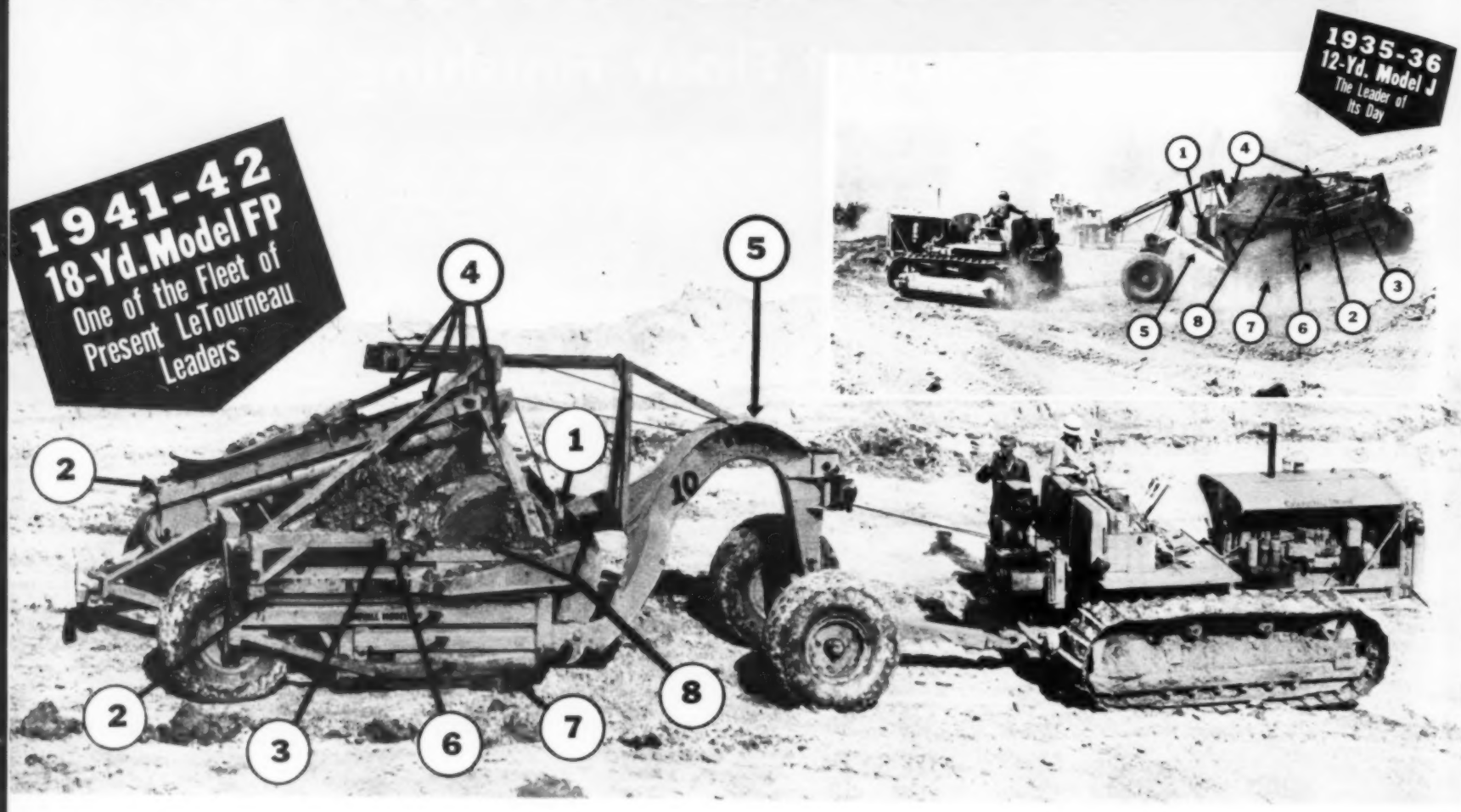
You get a denser floor with more even distribution of finer aggregates on the surface, due to the Grill action. This inexpensive, lightweight, collapsible and adjustable Tamper saves time and money on all types of surfaces. Write for full information.



WHITEMAN
MANUFACTURING COMPANY
3244 Casitas Avenue
Los Angeles, California.

How LeTOURNEAU's Steady Improvements in Scrapers

CUT YOUR EARTHMOVING COSTS



The old LeTourneau J-12 Carryall, shown at the upper right, was a great Scraper. It pioneered and established a new, lower-cost method of earthmoving that sold tractor-scraper operation to hundreds of new users. But R. G. LeTourneau wasn't satisfied. He improved it. It's always been that way at LeTourneau's—continual improvement. Invariably the changes have meant lower earthmoving costs to you.

How great these improvements have been, we've tried to show in two pictures here. Compare them point for point:

1935 CARRYALL	1942 CARRYALL
1 Apron sheave buried in dirt of full load—cable and sheave constantly subjected to wearing action of grit.	**1** Today, apron cable is dead-ended at apron, eliminating sheave and cable wear from dirt.
2 Side cables and sheaves constantly working in abrasive, cable-chewing dirt.	**2** Now, protected single side cable is dead-ended, with tailgate sheaves mounted on top of springpipe, out of wear's way.
3 Tailgate rollers on old J-12, rolling inside Scraper bowl worked in the load.	**3** Tailgate rollers now roll outside on side sheet reinforcement channels, thus minimize friction and roller wear, leave Scraper bowl unobstructed.
4 Single bracing on top made the J-12 strong enough for the old 75 H.P. tractors of its day—even stronger than many open-body type scrapers of today.	**4** Rugged overhead "A" frame, spring pipe and bracing stoutly welded to ends and sides, make for box-like Scraper structure.
5 Low Scraper yoke limited tire combinations.	**5** Rugged "goose-neck" yoke is stronger, provides plenty of tire clearance for many tire combinations.
6 Three welded steel side channels kept the J-12 from twisting and distorting in the toughest going.	**6** Today's FP Carryall has the added strength of 5 rigid channels on each side—a total of 10.
7 Wood-filled double bottom amply strong for single 75 H.P. tractors.	**7** Now strength of bottom greatly increased by steel filler channels to take strain and shock of 113 H.P. pulling and 113 H.P. pushing.
8 Heap of load limited by size of apron, height of bowl sides and top bracing.	**8** New, extended apron design and high bowl sides increase pay yard capacity in new models, hold in all the dirt you dig.

CABLE COSTS CUT 50 TO 75%

Despite increased load capacities, improved sheave arrangements have cut cable operating costs fully 50 to 75%, by moving cables up out of the load, to eliminate wear from abrasive materials.

Greater Strength for Bigger Power

The old J-12 was built for a 75 H.P. tractor. Today's modern Carryall is constructed to take full advantage of 113 H.P. pulling and 113 H.P. pushing. It gets huge loads quickly, hauls and spreads the toughest materials, without undue body strains, twisting, distortion or buckling. That's because it's built *like a box* . . . with sides and ends stoutly welded together by rugged overhead "A" frame, spring pipe and bracing. This additional overhead support eliminates the inherent weakness of ordinary open-body type scrapers.

LeTourneau engineers and servicemen, who know contractor needs through years of pioneer earthmoving experience, are continuing to improve Carryall Scraper operation under all conditions, on all kinds of jobs, to keep bringing you the newest money-making improvements in the scraper field. So, for more profitable equipment . . . keep in touch with your LeTourneau-"Caterpillar" dealer.

LETOURNEAU

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CARRYALL*SCRAPERS

ANGLEDOZERS*, BULLDOZERS, ROOTERS*, POWER CONTROL UNITS, TRACTOR CRANES, PUSHDOZERS, SHEEP'S FOOT ROLLERS, TOURNAPULLS*, TOURNATRAILERS*, TOURNACRANES.

*Name Reg. U. S. Pat. Off.

Cantilever Steel Bents

ON PIPE PILE FOUNDATIONS CARRY ELEVATED PARKWAY

(Continued from page 46)

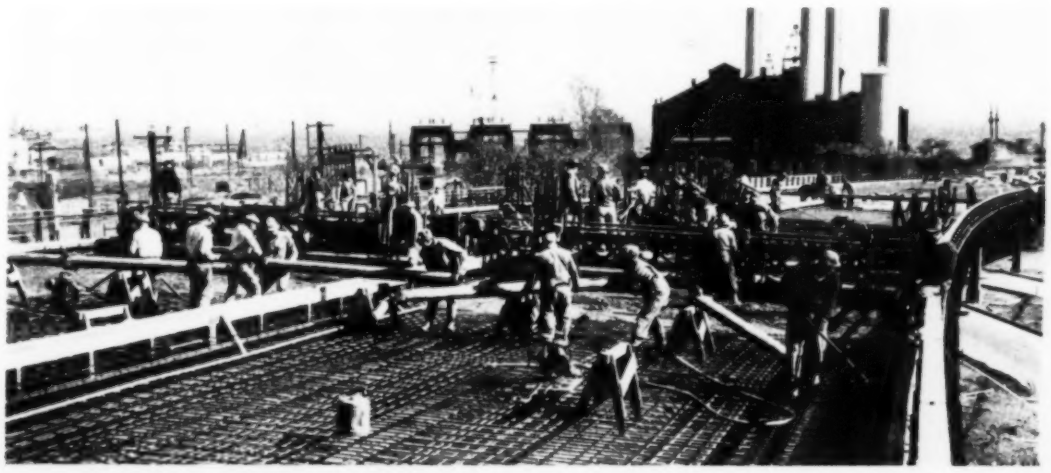
PUMPED CONCRETE discharges on roadway deck, where forms and reinforcement are in place for paving first half of divided four-lane highway on reconstructed El.

values in this area made the cost of additional land acquisition prohibitive, and the highway designers consequently were restricted to the available width between building lines, making it necessary to locate the supporting columns inside the curb line, where the existing El columns already stood. A study of the existing railway structure indicated that utilization of this structure, with needed reinforcing and reconstruction for the highway, would mean a saving of about $300,000, exclusive of a possible additional saving in demolition costs for removal of the old El. These facts determined the decision to rebuild the old El for highway use.

At the south end of the project a steel viaduct of conventional design carries the highway on a long reverse curve from Third Ave. to the connection with the Belt Parkway in Owls Head Park. This section includes girder spans up to 164 ft. long over depressed tracks of a Long Island Railroad freight yard.

Foundations for the new sections of the elevated highway called for an estimated quantity of 47.5 mi. of closed-end steel pipe piles, most of them 16-in. diameter, with some 18-in. and a lesser number 12-in. Driving difficulties in a region of filled-in former waterfront along Third Ave. from Prospect Ave. to 36th St. forced a change to open-end steel pipe piles in many places. Prior to encountering these added difficulties, the cost of steel piles based on estimated quantities and bid prices amounted to more than $1,000,000. Treated timber piles to carry lighter loads under some retaining walls and toe walls at Prospect Ave. grade separation and at the two end abutments required an estimated quantity of 80,000 lin. ft., costing

(Continued on page 88)



TWO FINISHING MACHINES strike off deck concrete supplied by concrete pump of Corbetta Construction Co. for paving both roadways simultaneously on steel viaduct between Owls Head Park and Third Ave.

R. G. LeTourneau, with 20,000th LeTourneau Power Control Unit which will do heavy duty in the Panama Canal Zone, handling big, extra capacity LeTourneau Carryall Scrapers on the canal widening project

WHY LeTOURNEAU POWER CONTROL UNITS

Are The Overwhelming Choice of Profit-Minded Earthmovers

Nov. 11, 1941, LeTourneau built its 20,000th Power Control Unit. That's more than all other makes combined . . . positive proof by contractor acceptance that the LeTourneau Power Control Unit's fast, sure operation puts money into pockets of users. Here's why:

STUDY THESE PROFIT-MAKING FEATURES

- LeTourneau Power Control Units give fast, positive control at all temperature extremes.
- Free-swinging, patented, fair-lead sheaves keep cable aligned straight to the equipment at any working angle; no rubbing on stationary parts.
- Self-reeving sheaves spool cable evenly onto drums, prevent piling. A patented feature.
- Correctly-shaped sheave grooves prevent flattening, give longer cable life.
- Positive, self-acting brake instantly holds when control lever is released. Smoother-operating, longer-wearing "Velvetouch" brake and clutch lining optional at slight extra cost.
- Oil and dust seals keep oil in and dirt out for long, low-cost life.
- Simple design—fewer parts in LeTourneau Power Control Units than in any other make—less repairs and adjustments needed—give absolute minimum operating cost.
- More bearing area—every moving part is set in bearings, which further adds to smooth operation.
- Rugged construction throughout, due to electric arc welded steels, yet lighter in weight.
- LeTourneau Power Control Units are standard control for your biggest money-makers—LeTourneau Carryall Scrapers, Angledozers, Bulldozers, Rooters, Tournapulls and Cranes.

Originally conceived by R. G. LeTourneau . . . continually job tested and improved through the manufacture of over 20,000 LeTourneau Power Control Units . . . here is your most dependable and profitable control. Sure, fast, powerful in operation . . . low in upkeep cost. Specify LeTourneau Power Control Units for bigger-yardage performance.

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FOR EMERGENCY CALLS . . . Gas main leaks — frozen water pipes — sewer obstructions — bridge and street repairs, etc. — where getting to the job quickly is of vital importance . . .

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are helping this contractor SPEED his work on a defense project by giving him A BONE-DRY SUBGRADE IN SHORT ORDER AT LOW COST.

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Foundation for gas storage tanks — 17' deep — 13' of water — no sheeting or bracing required.

MORETRENCH CORPORATION
90 WEST ST., NEW YORK
Rockaway, N. J. Joliet, Ill. New Orleans, La.

(Continued from page 87)

$92,000 at bid prices. Costs quoted here are exclusive of additional bid items for load tests on piles.

Steel pipe piles ranged from about 50 to 150 ft. in length. Pipe was ordered in double random lengths, about 45 ft. per piece. Both 16- and 18-in. pipe had a wall thickness of ½ in. Designed bearing values were 100 tons for a 16-in. pile and 150 tons for an 18-in. pile.

Unusually severe driving conditions were encountered by the Fehlhaber Pile Co. in Third Ave. from 20th to 36th Sts. Old maps show that the Brooklyn waterfront at one time lay along present Third Ave. in the Fehlhaber section. Buried cribbing, bulkheads, barges, boulders and steel opposed the driving of piles in this area. The obstacles were unexpected inasmuch as exploratory borings and preliminary test piles put down along the

CONCRETE CORE is placed in pipe pile in Third Ave. on Fehlhaber Pile Co. contract

curb line of the existing street had met no obstruction. When the piledrivers started work for the viaduct foundations in the widened right-of-way to the east of old Third Ave., following demolition of buildings on this property, the piles frequently encountered obstacles which twisted, dented and distorted the steel tubes. Closed-end piles were driven where possible, and open-end piles were substituted where necessary. Chopping bits, tried on the latter piles, proved ineffective, and drilling and shooting were adopted to shatter the obstructions and permit penetration of the piles. The piles were washed out with high-pressure air and water jets before being filled with concrete.

Piledriving at Intersection

Irregular and unpredictable driving conditions of different character were encountered at the Prospect Ave. grade separation, where the B. Turecamo Construction Co. completed a foundation contract calling for estimated quantities of 83,500 lin. ft. of 16-in. pipe piles and 10,000 lin. ft. of 18-in. piles. Driving ends of the piles were closed with cast-steel points. Although no substitution of open-

(Continued on page 90)

"BREAK" IS A LOT SMARTER THAN "BROKE"

ALTER EGO: Literally, "one's other self"—the still, small voice that questions, inspires and corrects our conscious action.

It takes nerve to BREAK with precedent and change over to welded construction.

ALTER EGO: It takes a lot more than nerve to keep on building the way we do—when we KNOW it costs more—when we KNOW welding is so speedy and will improve the structure. That's more than nerve. It's a bad habit.

But our customers are familiar with our present methods.

ALTER EGO: That's no asset. They're more familiar with CHANGE. If they read or look, they're familiar with the *change* to welded ships, welded trucks, welded steel machines, welded buildings—every metal structure whose completion had to be stepped up—fast.

Gee! People are getting more and more welding-minded. Isn't there danger of our customers going to our competitors for welded designs?

ALTER EGO: They're looking after *their* interests, aren't they? Why not look after *ours?* Let's BREAK with habit before it's a case of being BROKE.

• •

LINCOLN SUGGESTS: The easiest way to change over to welded design is to start with the simple elements and small structures. Then gradually apply welding to the larger, more involved designs. This will start giving you the 10% to 20% savings in steel tonnage and faster construction and will prepare you for the days ahead when welding will be a *must* in the construction business. Valuable experience with welded design can be gained now by applications such as pointed out in the current series of Structural Studies. Free on request.

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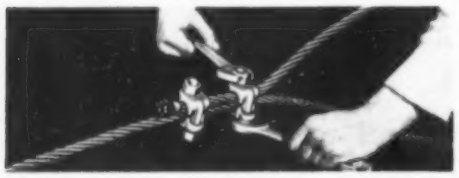
A Laughlin drop forged Safety Clip takes hold of wire rope with a sure, solid grip — just like a fist. It's no rope crimping "finger pinch," but a rugged vise-like hold. Tests have proved Laughlin Safety Clips twice as efficient as ordinary "finger pinch" U-Bolt clips.

SAVES WIRE ROPE. There's no bowing or distortion of wire strands in rope secured with Laughlin Safety Clips. So — no wire has to be discarded after Safety Clips are removed — with a resultant saving to you.

FASTER TO APPLY. Laughlin Safety Clip nuts are on opposite sides — easy to get at. Two wrenches can be used at once — you save lots of time clipping rope this *modern* way.



Write for free booklet describing many money-saving features of Laughlin safety clips. Also gives results of recent tests by a great engineering school, proving Laughlin Safety Clips 50% more efficient. Fill out coupon — today.

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Portland, Maine

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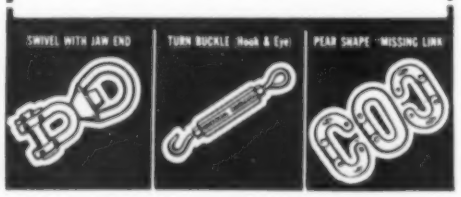

(Continued from page 88)

end piles was found necessary on this contract, the behavior of the piles while being driven was in some respects unusual. A number of the piles got little penetration when first driven, the points stopping at relatively shallow depth under as much as 500 blows per foot with a 5,000-lb. single-acting hammer. After standing four or five days, these piles again were put under the hammer and many of them penetrated 40 to 50 ft. deeper. This added penetration was spotty in location; one pile might get it while the adjacent pile refused further driving.

From Clinton St. at the face of the north abutment to 19th St. near the south end of the Prospect Ave. grade separation, an area covered by the contract already

COLUMN REINFORCEMENT of old El is completed by adding cover plates and welding corner seams to make tight box-section.

mentioned and by a second Turecamo foundation contract, pipe piles occasionally struck boulders or other obstructions which distorted the tubes, and additional piles were driven at these locations.

For the 16-in. closed-end pipe piles (100-ton bearing) specifications provided maximum penetration of not more than 1 in. in 20 blows under a Vulcan No. 1 hammer and required 5 min. of driving without appreciable additional penetration. On the basis of the *Engineering News* formula, this specification gives a 100-ton bearing value. Some 16-in. piles took 750 blows per foot with No. 1 Vulcans, the hammers used for practically all driving of pipe piles.

Erecting Steel Viaduct

Essential features and principal dimensions of the cantilever bent structures in Hamilton Ave. and in Third Ave. are

A BIG, FULL LOAD WITH EACH BITE

Because of their design and construction, Industrial Brownhoist clamshell buckets take extremely full loads with each bite, practically eliminate the need for hand shoveling, speed up material handling and cut handling costs. Quantity production plus our manufacturer-direct-to-you sales policy reduces your bucket investment. Write today.

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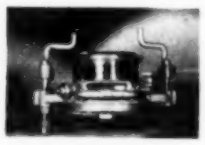

With a **Martin Decker Tension Indicator** on the job, you can eliminate theoretical calculations *and know line loads to the pound.* Easily portable for field use, you simply clamp it on the line and read the dial. Indicates tension in pounds, permits easy adjustment, catches damaging impacts and steady pulls *as they fall on the line.* No deadening. Easy, simple and fast for *anyone* to use. Comes in the size you want . . .

MINIATURE—for lines up to 1/16", capacity 200 pounds
STANDARD—for 1/4" to 3/4" lines, capacity 15,000 pounds
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shown by drawings reproduced with these notes. Photographs indicate the erection methods employed by the Harris Structural Steel Co., contractor for the steel structure on both sections, which followed its established practice of fabricating the steel as completely as possible in the shop and delivering large shop-fabricated units to the field for erection.

Cantilever bents in Third Ave. were framed and set up in one piece with the aid of two crawler cranes, one handling the complete bent unit and the other setting a connecting girder which tied the new bent to previously erected steel. Bents in this section are uniformly spaced, 52 ft. c. to c., with an expansion joint in the deck at every third bent. In Hamilton Ave., because of the greater height and weight of the bent, the tall columns and built-up cross strut at the top were erected as separate units. All floor beams, however, were assembled complete in the shop and were set as a unit, as indicated by a photograph and by the caption of one drawing. These floor beams were 72 ft. long and weighed up to 17 tons with expansion dams in place for the expansion joints, located at every third bent. Double bents are used at these expansion locations, under end floor beams carrying matching halves of finger-type expansion joints.

Girder spans on this section of the highway ranged from 66 ft. to 216 ft. in length; the 216-ft. span is over the Gowanus Canal. Girder lifts varied from about 25 tons to 72 tons. To make the heaviest lift, the steel erector used two 35-ton travelers on the deck. A 60-ton crawler crane on the ground and 35-ton traveler on the deck erected the steel in each approach to the canal.

In all, the contractor erected 7,755 tons of structural steel in Hamilton Ave., and 5,475 tons in Third Ave.

Revamping El Structure

Reconstruction of the old elevated railway structure in Third Ave. from 36th St. to 62nd St. was carried out by the P. T. Cox Construction Co., Inc. The rebuilding of the structure required 3,700 tons of structural steel, 445 tons of new metal parts, removal of 54,000 complete rivets and 34,500 rivet heads, 14,200 new rivets, 85,000 lin.ft. of single layer weld and 7,700 lin.ft. of multi-layer weld. Structural steelwork was handled by a subcontractor, the Mt. Vernon Bridge Co., and welding was done by another subcontractor, the J. K. Welding Co., employing 25 welding outfits.

For three blocks from 39th to 36th Sts., a change in deck grade of the remodeled structure required the demolition of old steel and shortening of the columns. The work on this part of the job, involving 1,100 tons of structural steel, also was performed by the Mt. Vernon Bridge Co., subcontractor.

After the old El had been stripped of railway tracks and stations, the existing columns, floor beams and stringers were

(Continued on page 92)

Out of the Forge of War will come Better Tools for Peace

Science, research and inventive genius are accelerated and stimulated under the pressure of war. Without digging any deeper, we must admit the truth of this phenomenon as, perhaps, the only economic good that ever comes of international conflict.

Already, better means, methods and metals make it plain that tomorrow's tools of Peace will be better tools. Our own research, as well as others', shows this clearly. Every time a Williams' forging hammer pounds, we are seconds nearer to better days — better things, and better tools.

To that end, we are doing all we can do, the best we know how to do it. In a brighter future, as in the past, that will continue to be our policy.

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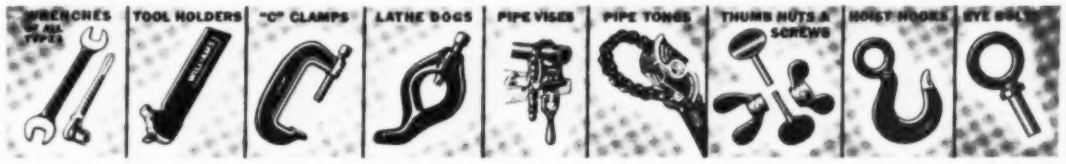
for over half a century

for DROP-FORGINGS and DROP-FORGED TOOLS



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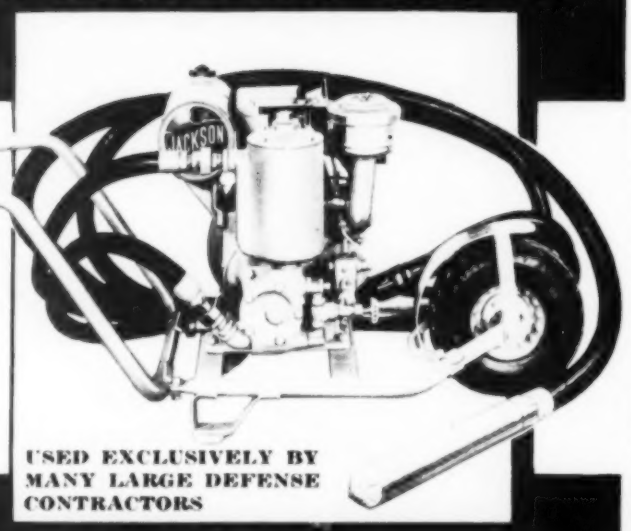
DESIGNED TO "TAKE IT" 3 SHIFTS A DAY—EVERY DAY

Automatic pressure lubrication—requires no attention.
34-ft. hose—2¾" vibrator head.
Adjustable frequency to 6800 R.P.M.—submerged in concrete. Powerful gas engine—4.7 H.P.
Long lived, ball-bearing, rotary, hydraulic pump.
(Used exclusively by many large defense contractors).



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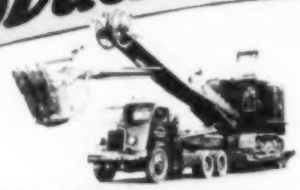

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2• THOUSANDS OF NEW FACTORIES,

3• MILLIONS OF ADDITIONAL KILOWATTS,

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EXPERIENCE builds 'em
PERFORMANCE sells 'em

PLAYED IMPORTANT PARTS IN THESE PREPARATIONS

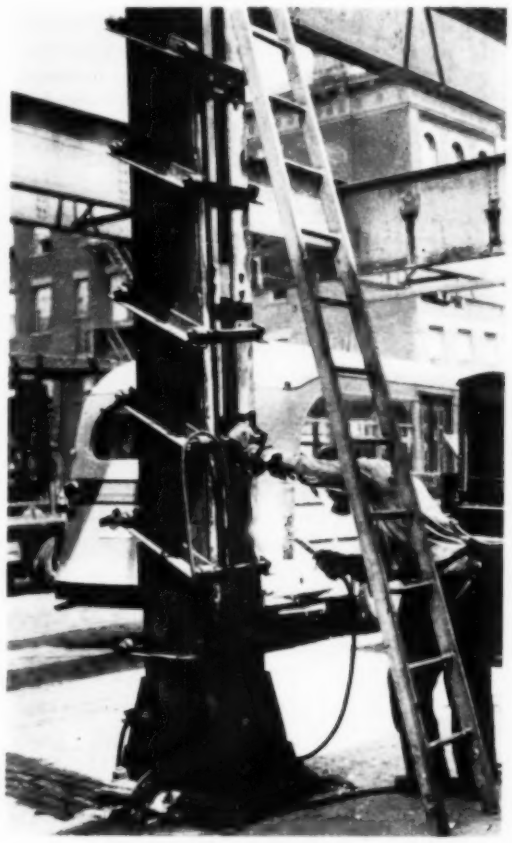
ROGERS BROTHERS CORPORATION • 220 ORCHARD ST., ALBION, PA.

(Continued from page 91)

reinforced to carry the heavier loads of the elevated highway and additional floor framing was placed for the new deck. Where the old steel had been weakened or eaten away by corrosion, it was reinforced or replaced as required. Accompanying photographs indicate the general procedure employed in reconstructing the old El. Fascia girders and guard rails on this section of the viaduct are the same type as used elsewhere, tending to give it uniformity of appearance.

Concrete deck paving on this contract was placed by the P. T. Cox Construction Co. with a concrete pump and pipe line, using concrete delivered to the job by truck mixers from a commercial plant and handled into the hopper of the pump by crane and bucket.

Deck paving on the remaining steel structure in Third Ave. and in Hamilton Ave. was placed by the Corbetta Construction Co. under separate contract. This



BOLTED ANGLE CLAMPS hold first pair of cover plates in place for welding on old latticed El column. Rivet heads are removed to permit placing plate flat against steel angles of old column.

contractor likewise used a Pumpcrete and pipeline, but mixed the concrete with a paving mixer at the site of the pump. Paving and structures at the Prospect Ave. grade separation were completed under a contract executed by the Ross Galvanizing Iron Works, Inc., and the Craven Construction Co. Elaborate construction was required by the design at this intersection of Third and Hamilton Aves. The plans called for entrance and exit connections from the elevated parkway to the surface streets at this point. To assist the designing and constructing engineers in preparing and comprehending the intri-

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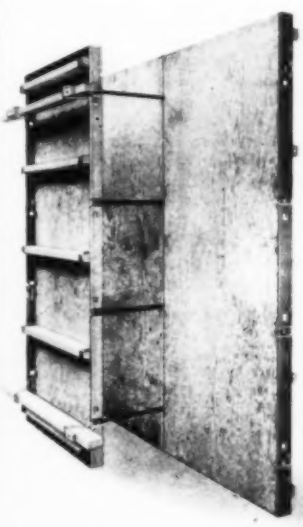

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cate detail drawings for the intersection, Madigan-Hyland, consulting engineers, built a scale model of the project in wood. The work at the intersection required some 4,100 tons of structural steel in the viaduct and grade separation bridges.

At the south end of the project, the Corbetta Construction Co. built the section of viaduct from Third Ave. to the connection with the Belt Parkway. The American Bridge Co., as subcontractor, erected the 4,150 tons of steel in this section, setting girders up to 164 ft. in length across the Long Island Railroad freight tracks as shown by one of the accompanying photographs.

Administration

Planning, engineering design and construction of the Gowanus elevated parkway were carried out under the general direction of Robert Moses, chairman of the Triborough Bridge Authority, and Paul Loeser, general manager, with Harry Taylor, assistant general manager, in charge of construction. Madigan-Hyland, New York City, acted as consultant to the Authority on design and construction. In the latter organization, E. H. Praeger is chief engineer, and H. W. Hudson is construction engineer. Field work was under the supervision of R. B. Dilnenbeck as resident engineer.

* * *

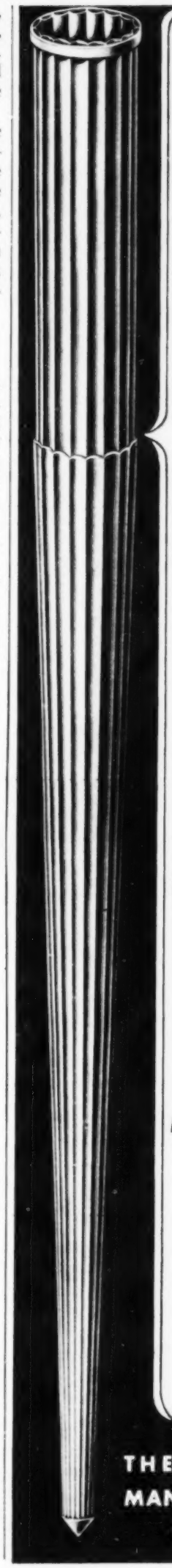
Prefabricating Shop Speeds Erection of 500 Houses in 49 Days

(Continued from page 60)

the fabricating mill was in operation. Ten semi-trailers delivered the house sections to the job from the Newburg shop. House sections were unloaded in front of the various house locations ahead of the erecting crews.

While the foundation work proceeded in the field, the fabrication shop in Newburg, 26 mi. away, produced completely fabricated units for all the house parts. These parts consisted of floor sections, wall sections, ceiling sections, gable ends, roof sections and, also, steps, door hoods and coal bins. All framing lumber and Homasote for the various sections were precut and stored on racks. Everything was scheduled beforehand, and the men worked from the prepared schedules. Pre-cut members were delivered to the various jig tables for assembly. Framing members for

(Continued on page 94)



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MATERIALS & METHODS FOR EVERY CLEANING REQUIREMENT

(Continued from page 93)

windows and doors and various wall intersections were prefabricated into sub-assemblies which were placed on the jig tables in accordance with the proper positioning of the studs.

Large sheets of Homasote were both glued and nailed to the assembled wood frames. This double means of fastening provided a type of construction which is considerably stronger than the ordinary, conventional job.

All wall sections were fabricated in the order in which they were to be erected. When piled ready for the delivery truck, they were stacked in reverse order, which caused them to come off the pile in the proper order at the site. Surprisingly enough, the various sizes of sections, regardless of the type of building, were accommodated perfectly on the jig tables. Each section was marked according to its number on the plan and, also, in accordance with the number of the table on which it was made. If any errors occurred they could be traced immediately to the proper table, the crew of which then could be advised to prevent any repetition of errors of the same kind. Completed sections taken off the finishing end of the table were piled at right angles to the table on a platform which, when loaded, was transported to the site.

House Erection

When a loaded truck reached the site, a crane unloaded the full set of sections for each complete house alongside the house foundation. Fabricated floor sections complete with finished floor were placed and bolted together, and the house then was ready for the erection of the wall sections.

As the first step in wall erection, the assembly crew erected a corner in the rear of the house and then set successive sections across the rear of the house to, and including, the next corner. After putting the bathroom partition in place, the crew, consisting of several carpenters and laborers, moved to the next house. Meanwhile the plumber's crew moved in and installed prefabricated plumbing lines in the bathroom walls. At the same time the plumbers set the tubs. Then the erection crew came back and completed erection of the remainder of the walls and partitions. As the sections were put in place, a carpenter stayed on top and tacked them together prior to the installation of continuous plates to which the sections were fastened with lag screws.

Training a crew for this work was a simple process. Once trained, the men were able to erect the wall sections of a house in 25 to 30 min., although the average erection time for the entire job was somewhat longer. Roof, ceiling and gable sections were installed with a crane in about an hour. No utilities were available at the site, and all power required for the many electric drills, nut runners and floor sanders was supplied by portable plants.

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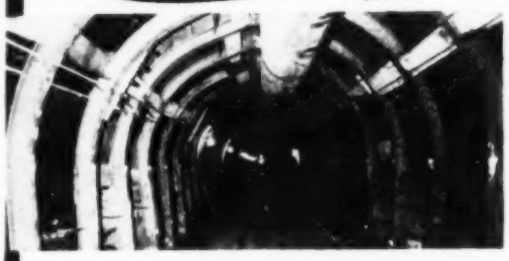

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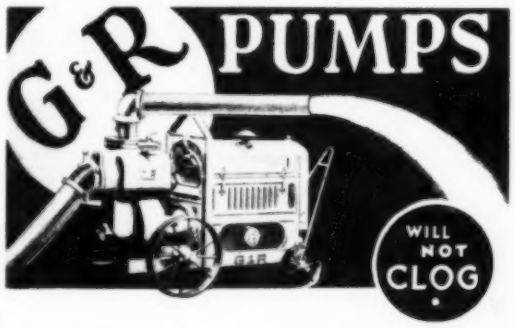

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on the job, where he prefabricated all water and soil pipes, the plumber followed immediately behind wall erection. Electrical conduit and outlet boxes were installed in the fabricating plant at Newburg, and wiring was completed after erection and before painting. In each house a brick chimney with flue lining was erected in four steps: (1) from the ground up to the finish floor, prior to the placing of floor sections, (2) from the finish floor to the ceiling, (3) from the ceiling to the pitched roof, and (4) from the roof to the top. As soon as a house had been erected and completely bolted, the painter finished all walls and ceilings. Interior trim was stained in a millwork building at the site.

Frames and Trim

Doors and windows complete with jambs, the jambs being cased on one side, were placed in openings after structural erection had been completed. All interior trim such as shelving, picture molds, corner mold and base was stained and lacquered in the millwork building on the site. All interior trim material which could be pre-cut at this field mill was so handled. Sufficient interior trim for completion of one house was individually bundled and taken to its proper house for installation.

Progress

During field operations, many rainy days seriously handicapped erection and completion of houses. In spite of these delays, progress was sufficiently rapid to attain completion of the 500 houses in 49 calendar days following the start of erection on the first house. Erection started on August 28, and the last house was assembled on its foundation October 15.

Erection Time

During the entire job, the plumber took an average of 17 min. to hang the prefabricated plumbing for the bath and kitchen, screw on the necessary connections and place the bathtubs. A roofing contractor averaged eighteen roofs applied per work day; the roofing was an asphalt 3-in-1 heavy shingle. On chimneys, the bricklayer completed an average of fifteen houses per day; twenty houses were trimmed out on exteriors and 30 houses were completed each day on all interior trim, including the setting of kitchen cabinets, hardware, shelving, shades and screens. The crew erecting front and back porches and coal bins averaged 25 houses per day.

Job Management

Barrett & Hilp's organization was under the direction of George V. McKeever, general superintendent, who made several trips by plane from San Francisco to the site. The writer was project manager in complete charge of the job and the Newburg mill, Harry Tuck was field superintendent, John Sparolini was assistant superintendent, R. M. Peart was general

(Continued on page 96)

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(Continued from page 95)

erection foreman, and George Kovacevic was foreman in charge of trim. B. A. Stephenson handled the purchasing from the Newburg office, and Fred Eyrond was cost accountant. All these men are from Barrett & Hilp's San Francisco organization.

* * *

Reclaimed Pipe WELDED INTO STADIUM FRAMEWORK

(Continued from page 67)

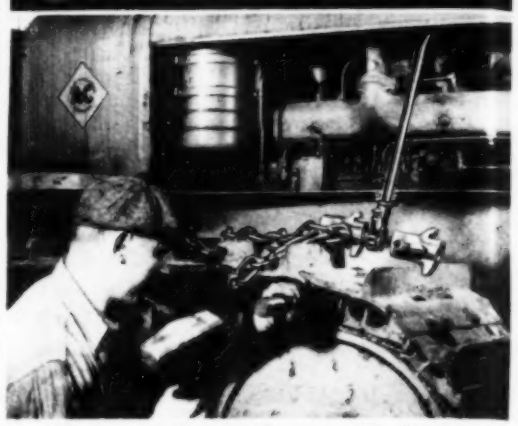
ft. long, 33 ft. 6 in. deep, 24 ft. 4 in. high at rear, having 13 rows of seats with a seating capacity of 4,000. An open space beneath the structure provides for bus storage. All of the pipe was reclaimed from oil fields with the exception of the 4-in. columns. After the pipe had been wire-brushed to remove scale and rust, a red lead base and a coating of aluminum were applied.

The first step in construction consisted of placing 51 rear main columns of 4-in. pipe. These were anchored to the footings by means of a steel base plate welded to the base of each column and bolted to the footings. The second step was the placing of an intermediate row of columns, also of 4-in. pipe. The placing of 3-in. pipe members connecting the intermediate with the main columns constituted the third step of construction. The fourth step was the erection of two 3-in. pipe stringers running the length of the stand between the main columns at mid-points and at the top of the structure. The fifth step consisted of placing the short 4-in. columns at the extreme front of the structure. The sixth step covered erection of the diagonal main seat beams running from the front columns on to the intermediate and finally joining with the longitudinal stringer at the top of the structure. Erecting the short 3-in. diagonal braces between the diagonal seat beams and the bases of the intermediate columns constituted the final step of framework construction. The seat risers are 4-in. pipe, and the members upon which the wood plank seats rest are 2-in. pipe. Two-inch pipe also was used for railings at the top and bottom of the stand.

All details of fabrication and connections were carried out in the field. This work consisted of cutting the pipe to the desired sizes, shaping the ends and making connections for arc-welding all joints. The shielded-arc process of electric welding, with Lincoln equipment was used.

Arc-welded reclaimed pipe also was utilized in constructing ten poles, each 60 ft. high, and equipped with six 1,500-w.

UTIL-A-TOOL



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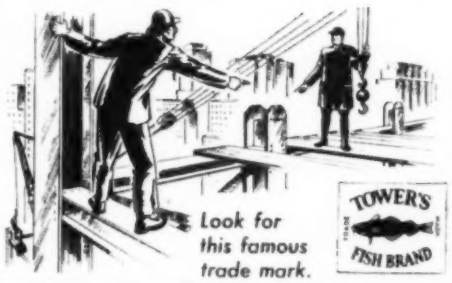

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lamps. The lamps are mounted on a frame of 3x3x3/8-in. angles welded to the pole. Pipe of 8, 6 and 5 in. diameter was used for the poles.

The cost of the new grandstand was $2,500, which represents a 50-per cent saving over the use of new pipe.

* * *

Timber Construction

Used for Grain Storage Building Project in Canada

(Continued from page 55)

Carter-Halls-Aldinger Co., Ltd., of Winnipeg, eight buildings; Bird Construction Co., Ltd., of Winnipeg, seven buildings; Thunder Bay Harbor Improvements, Ltd., of Port Arthur, three buildings; and Barnett-McQueen Co., Ltd., of Fort William, two buildings. Two buildings were erected by the owners' own crews.

Approximately 22,000,000 b. ft. of lumber were used, and 350,000 cu. yd. of material moved for excavation and fill.

Nineteen of the buildings have a unique, built-up wood floor. This is laid on an all-over crushed stone foundation which is spread absolutely level. Two-by-twelves are laid flat and solid on this foundation. At right angles, 2x4s are also laid flat. Crossing these are 2x6s on edge, 12 in. on center. This forms a base for a layer of galvanized iron sheeting with building paper on top. To complete the floor, shiplap is nailed over all.

Side walls are constructed of 2x6s piled flat to a height of 14 ft. and spiked together in standard cribbed wall manner, on which is piled an additional 8 ft. of 2x4s, also flat, making walls 22 ft. high. These are supported laterally by 12x14-in. posts on 9 ft. 6 in. centers, anchored to concrete at the foot and tied back with diagonal 2-in. steel rods to provide stability against wind pressure when the building is empty.

The roof is supported by four-post towers, braced on the four faces. These towers are spaced on 28 ft. 6 in. centers. Roof beams are placed on top of the towers and joined by Teco timber connectors to form a continuous member. In addition, braced transverse ties are bolted continuously across the building. The roof decks are made of 2x10-in. joists and 1-in. shiplap. The roof slope is 5 in. vertical to 12 in. horizontal. At the ridge, a small cupola is framed to contain a conveyor belt for filling the building.

In thirteen of the buildings, a central tunnel of reinforced concrete for a conveyor belt was placed partly below the floor level, with openings in the side for drawing off the grain. In nine, openings

(Continued on page 100)

South Bend

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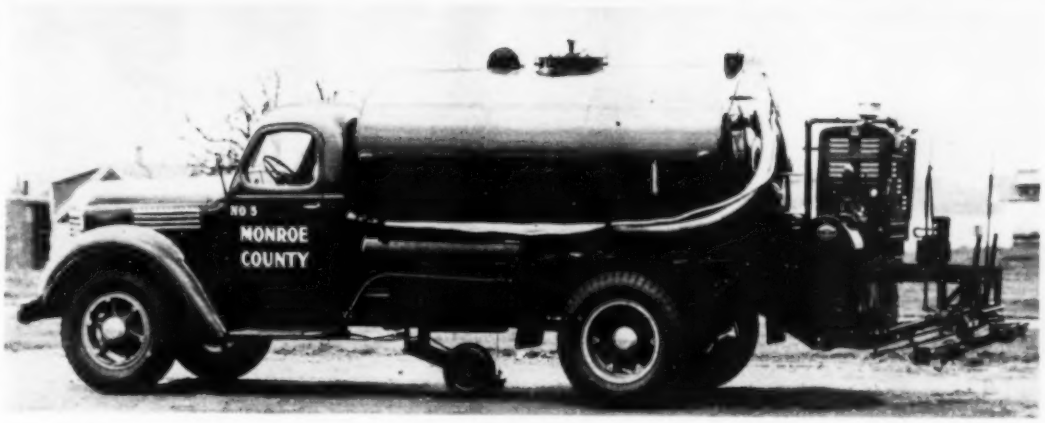

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HIGH early strength concrete is an almost indispensable aid today in speeding up defense construction.

CEMENT DISPERSION, concrete's most important technologic advance in a decade — *through* POZZOLITH — produces 3 day normal strength in 24 hours, 7 day strength in 3 days, 28 day strength in one week — *25% more strength at later ages.*

And this — *with normal portland cement;* guaranteeing important savings and vastly improved structures.

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1. Durability increased 50% or more.
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3. Increased water-tightness — 20% or more reduction in absorption and permeability.
4. Reduced bleeding and segregation.
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Send for Research Paper No. 36 "Economics of Cement Dispersion" and complete facts on Pozzolith.

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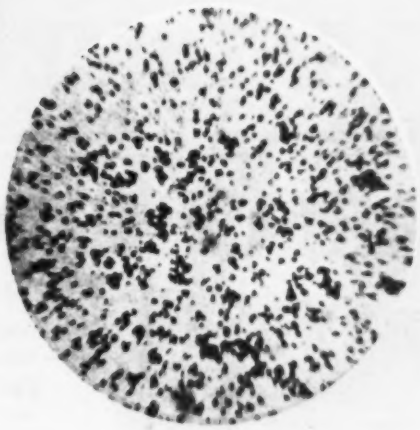
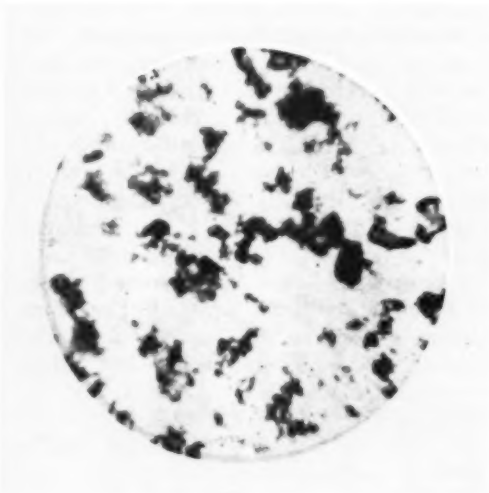
HOW CEMENT DISPERSION WORKS

Only a part of the cementitious value of the cement, whether normal portland or high early, is utilized under usual construction conditions. Investigation shows that with 28 days curing only 50% hydrates. [Anderegg and Hubbell, A.S.T.M. 29 II 554 (1929)].

Dispersed cement produces 25% to 40% higher compressive strengths.



DISPERSED



UNDISPERSED

WITHOUT POZZOLITH

Cement particles in their normal state in water tend to gather in bunches; i.e., flocculate. Water never reaches some particles and many are only partly hydrated. This reduces the effectiveness of the cement, entraps water within the clumps, requires an excess of water for placement and often results in bleeding and segregation. See photomicrograph at left.

WITH POZZOLITH

With Pozzolith the dispersion principle operates to drive each particle apart, thus exposing all the cement particles to the vital hydrating action. See photomicrograph above.

This dispersion makes the cement usable to its maximum efficiency since all the water is made available for lubrication of the mix and the entire surface area is exposed for hydration.

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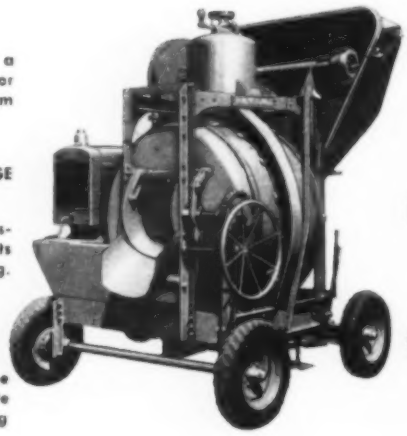
22" diameter intake and discharge opening in drum permits faster charging and discharging.

4 TWO-PIECE DISCHARGE CHUTE
One section is stationary, the other movable. This permits chute to be swung out of drum during mixing period.

5 SPRING-MOUNTED ROLLER BEARING WHEELS
Road shocks absorbed through spring mounted roller bearing wheels.



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8" channel sills with four cross members all welded into solid frame.

9 HIGH CARBON STEEL DRUM SHELL
Drum shell, mixing blades and pick-up buckets all of high carbon steel.

10 MACHINED DRUM TRACKS
High carbon steel drum tracks are welded to drum then entire drum placed in lathe and track machined to a true circle, assuring accurate alignment.

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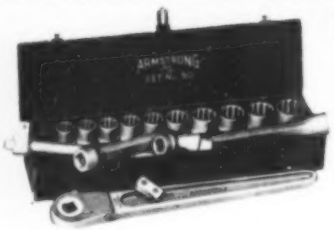

WRENCHES
— open end
— Box Socket
— Detachable Socket
— Construction Ratchets

There are ARMSTRONG Wrenches for your every need and each is the finest tool of its type.

ARMSTRONG Socket Wrenches extensions and handles are Chrome-Vanadium Steel. Ratchets are drop forged steel and the patented ARMSTRONG Drivelock locks sockets, driver, ratchets and handles to each other — will not knock or pry apart, sockets can not fall off.

ARMSTRONG Giant Construction Ratchets are *drop forged* steel. Nut sockets are *machined* from solid bar stock.

ARMSTRONG Drop Forged

Structural and Construction Wrenches come in several types, in high carbon or Chrome-Vanadium steel. Large stub end box socket wrench takes long slip over handles.

Write for Catalog

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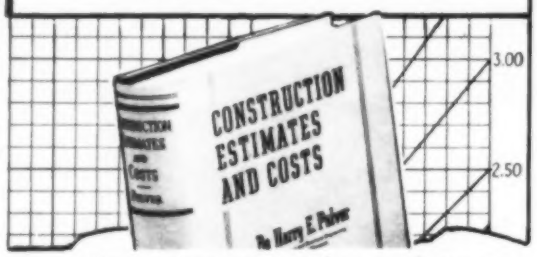

You know how much in profits it was I mean to you to have more accurate estimates with less discrepancy between estimated and actual costs — how much in business gained by closer bidding. Now, this book helps you achieve these results. It will pay out further in time saved, by helping you to get accurate estimates more quickly and easily.

H. E. Pulver's

Construction Estimates and Costs

653 pp., 6 x 9, many diagrams and tables, $5.00

Takes up each step of construction work separately — from first investigation to final, detailed estimates — and provides simple, arithmetical methods of accurately estimating costs. Covers estimating with both tables and diagrams and includes specimen tables and diagrams. Both diagrams and tables show variations in quantities as well as in prices of material and labor. Worked-out estimates for typical jobs show application of methods.

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(Books sent on approval in U. S. and Canada only.)

(Continued from page 97)

were left in the side walls and the conveyor belts placed on the ground outside the building.

Five buildings are connected to the terminal elevator by direct spout and 17 by conveyor gallery. These galleries cross roadways, railways, power lines, etc., and most were constructed with four-post braced towers and truss spans. The trusses and towers were prefabricated on the ground and raised to place by crawler cranes. In all, 12,000 ft. of such galleries were erected and a high rate of speed was obtained by this construction system.

The Howe company specified Teco construction in the tower framing for the roof supports and in the trusses and towers for conveyor galleries. Satisfactory results were obtained with this system of construction in the towers, according to J. M. Fleming, Howe president, by a few skilled men mixed with unskilled labor, of which an ample supply was available at the lakehead. In the case of the trusses, however, a larger proportion of skilled labor was required. Teco connectors and installation tools were supplied by V. H. McIntyre, Ltd., Toronto, Canadian distributor for the Timber Engineering Co., Washington, D. C.

* * *

2-in-1 Machine

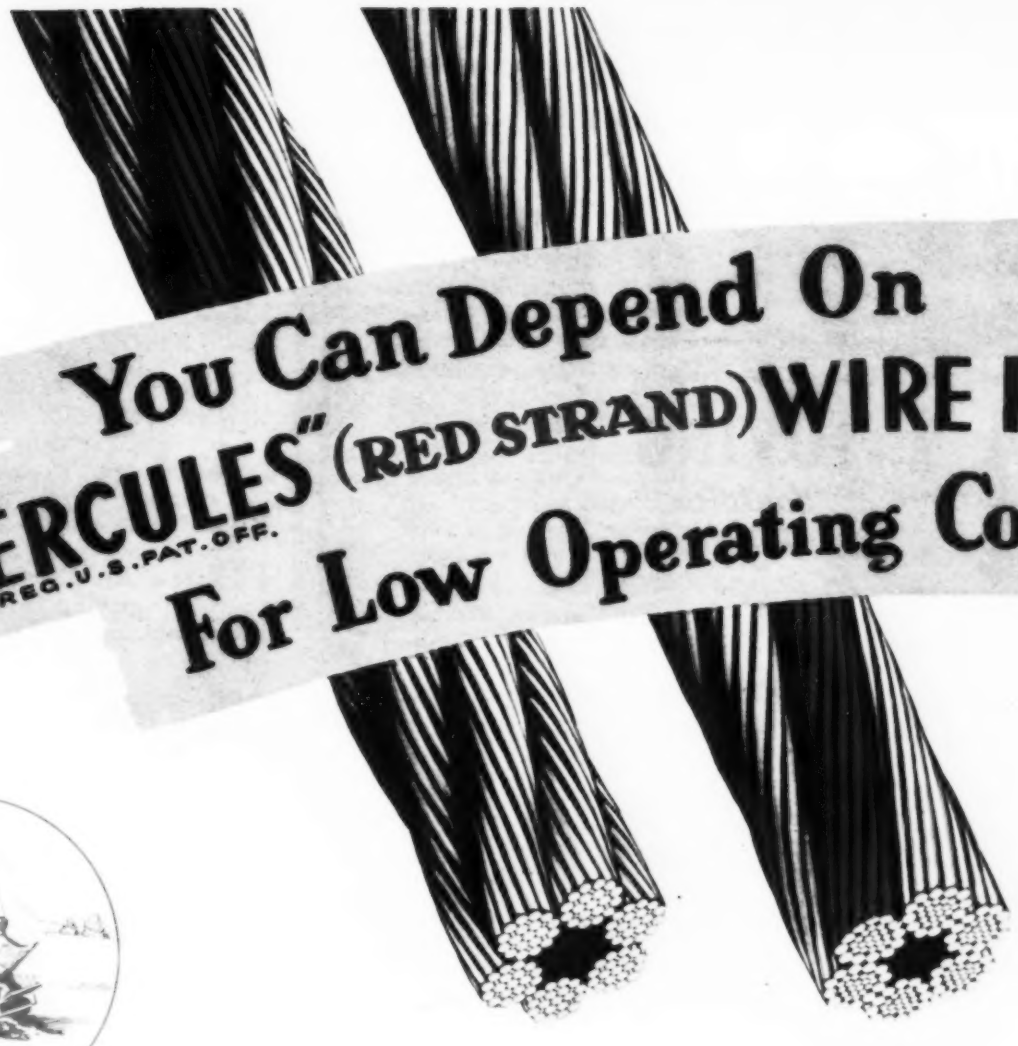
Spreads and Finishes Bituminous Surfacing

(Continued from page 47)

proximately 4 days and then going back and completing the other side. In laying the first half, the screed of the spreader-finisher machine worked on the forms, using an adjustable strike-off to obtain the correct level for the binder course and on dollies for the top course. For compaction an allowance of ½ in. was made. On the second half of the roadway, the machine was carried at its outer end by the side forms and at its inner end by ½x6-in. steel strips 10 ft. long, laid along the inner edge of the surfacing already in place for the first half of the pavement.

Progress in placing the binder course was at the rate of 14½ ft. per min. on a 20-ft. lane with 1½-in. compressed thickness equivalent to 32 sq.yd. or 2.4 tons per minute. On the top course speed was ordinarily 8-10 ft. per min., but when the temperature of the mix was kept up to 300 deg. F., the progress was 14½ ft. per minute. In other words, with trucks delivering without delay, material was placed at rates of from 120 to 150 tons per hour. Maximum daily run in 8 hr. was 3,600 lin. ft.

The operating crew consisted of: 1 truck dumper; one machine operator; 2 rackers; 2 tampers, and 2 laborers, constituting the minimum union requirements.



You Can Depend On "HERCULES" (RED STRAND) WIRE ROPE For Low Operating Cost

REG. U. S. PAT. OFF.

Are you taking advantage of the time and money saving possibilities of Preformed "HERCULES" (Red-Strand) Wire Rope? It is available in both Round Strand and Flattened Strand constructions. In "HERCULES" there is a right rope for every heavy duty purpose. We would be glad to give you full particulars.

Production requirements must be met. Why not let "HERCULES" (Red-Strand) Wire Rope help you meet this demand and still maintain a reasonable margin of profit?

You can rely on "HERCULES" to keep costs down, because it is made on the principle that—*"With wire rope it pays to use the best"* . . . In its entire process of manufacture, exacting tests and rigid inspections leave nothing to chance. All this, plus manufacturing efficiency, means longer rope life at no higher cost.

You will quickly discover that "HERCULES" (Red-Strand) Wire Rope is a dependable ally—not only in today's fight against increasing operating costs—but also in your endeavor to speed up production. Specify it on your next requisition.

MADE ONLY BY

A. LESCHEN & SONS ROPE CO.

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DIGGING
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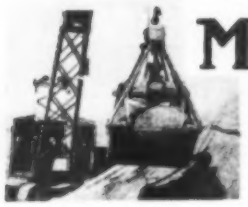

MOVING
Various
Materials
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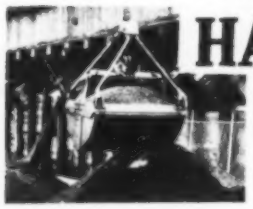
★ ★ ★



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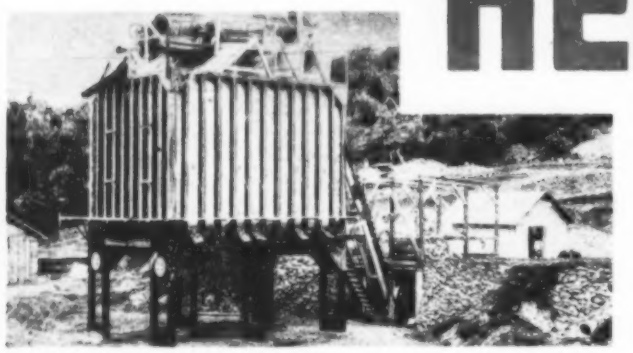

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A complete unit—rapidly set up, inexpensive to operate, insuring large capacity, very little vibration. Crushing, elevating, washing, screening done on spot, materials stored in Reliance Steel or Wood Bins (completely fabricated, easy to erect). Experienced contractors put these Reliance Units together quick to meet any job capacity — at a profit. You, too, will do well to investigate.

PORTABLE with V-BELT DRIVE

Whether you use this Reliance Portable Crusher alone or in combination with an Elevator, Chute Screen, etc., you can get no better value for your money in terms of capacity, low operating cost and rugged durability. The Reliance Crusher is famous for its strength and simplicity. It is particularly stable. A "swell" buy for crushing on any job. Send for detailed circular.

PRODUCTS:
Reliance offers a complete line of Rock Crushers; Bucket Elevators; Revolving Screens; Storage Bins; Pulverizers; Chip Spreaders; Heating Kettles; Bin Gates; Feeders; Belt Conveyors; Grizzlies; Air Separators; Sand and Gravel Spreaders; Wash Boxes.

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DISTRIBUTORS in ALL PRINCIPAL CITIES of U. S. A.

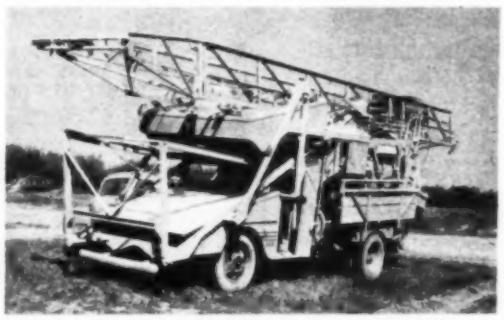
Truck-Mounted Tower-Mixer Units

Produce Concrete for Aircraft Plant

(Continued from page 39)

Repeat-O-Matic liquid meter. The entire tower-mixer unit was mounted on a Ford truck equipped with a Mercury V-8 engine which powered the charging skip, mixer and tower hoist. A unit could be moved from one set-up to another on the job in a few minutes.

For moving from job to job, the Mixermobile folded to a compact unit with an



FOLDED FOR TRAVEL. with tower lowered and front runway tray opened to expose windshield, truck-mounted tower-mixer unit can make 30 to 45 m.p.h. on road. This photograph was made on project in Michigan.

overall height of 11 ft. 4 in., a width of 8 ft. and a length of 35 ft. In this compact condition, the charging skip was carried in raised position above the cab, the metal pan between rails of the skip track was revolved downward to uncover the windshield, giving unobstructed forward vision for the driver, and the hoist was folded down over the mixer. When thus made ready for travel, the Mixermobile was capable of making a speed of 30 to 45 m.p.h. on the road. Rated mixing and hoisting capacity of the plant, as given by the manufacturer, is 40 cu.yd. per hour or 300 cu.yd. in an 8-hr. shift.

U-Shaped Hoist Tower

According to information from other jobs, the U-section tower is a commendable feature of the mobile plant. Experienced men can raise or lower the tower in 5 min. All connections are pinned, and no bolts are used in raising or lowering the tower. For heights up to 65 ft., the tower can be lowered intact to make moves on the job. When the height is greater than 65 ft., the top section must be removed before making a move. Because of the U-shaped tower, the hopper may be set in any position on the tower. The bucket and hopper deliver concrete nearer to the top of the tower than is possible with ordinary hoist towers, making the unit particularly effective for use in restricted overhead clearance inside buildings.

One cap does the work of a Thousand

IMPORTANT

Branch lines should lead away from main lines at right angles. Avoid kinks and small loops.

A single fuse and cap or electric blasting cap, attached to the end of the trunk line of Primacord, will detonate the entire blast. The cap detonates the Primacord, releasing a detonating wave that travels at approximately 3.9 miles per second to detonate every cartridge in every hole. The use of Primacord obviates the need for blasting caps in the holes, and makes the hookup simple and labor-saving. Send for the Primacord Booklet —free.

PRIMACORD BICKFORD

Detonating Fuse

PB-99

THE ENSIGN - BICKFORD CO.
Simsbury, Conn.

Makers of Cordeau-Bickford Detonating Fuse—and Safety Fuse since 1836

Blackout Bomber Plants

(Continued from page 53)

could deliver in the limited time allowed. The Bethlehem Steel Co. has been able to meet the required schedule on steel for Fort Worth, however, by distributing this work among seven of its plants at different locations. Several companies have cooperated in production of the steel for Tulsa, which is being fabricated under a contract with the Midland Structural Steel Co. of Chicago, in seventeen shops throughout the Mississippi Valley and the Southwest.

Because all of the 171 trusses of 200-ft. span required for the main aisle of each plant are 25 ft. deep and an equal number of 120-ft. trusses for the side aisle, 16 ft. deep—all too high for shipment of any completed sections by rail—they are being assembled entirely on the site. While most of these spans weigh 40 tons and 25 tons, respectively, and can be assembled on the ground and raised into place in one piece, 115-ton jack trusses of 200-ft. span are being assembled in place with the aid of heavy falsework.

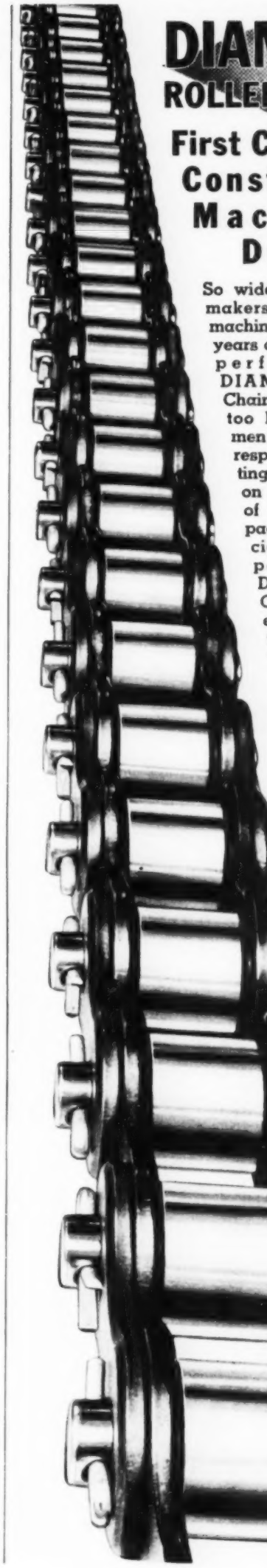
Only one 200-ft. hangar door opening has been provided in each plant, that being at the end of the assembly line. These doors, and eight 200-ft. doors in the nearby hangar building, will be of the Truscon vertical lift type, installed in units 100 ft. wide to operate independently of each other. Four 150-ft. single-unit doors of the same type will be used in the paint shop. All will be 40 ft. high and insulated in a manner comparable with the side walls, with weatherproofing at jambs in keeping with the requirements of air-conditioned buildings. Truscon has been fabricating the doors, the steel panels, expanded metal lath, clips and other erection fittings at its plant in Youngstown. The Fiberglas products are being produced at the Owens-Corning plants in Newark, Ohio.

Roof and Walls

The assembly buildings and a majority of the auxiliary structures at each plant have an overall height of 65 ft. A 13-in. curtain wall of face brick and acoustic block, which is being specially reinforced with trussed rods to make it shatter-proof, rises to a height of 12 ft. around the base of all buildings. The special insulated metal wall extends from that point to the roof. Fiberglas insulation board continues right down to the base of all walls through the masonry in order to insure absolute control of condensation. Even the bolts used to anchor the upper walls to steel girts are being insulated to prevent any continuous steel contact between exterior and interior.

The roof and wall construction are uniform in all buildings at each site, includ-

(Continued on page 104)



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First Choice for Construction Machinery Drives

So widely used by the makers of construction machinery,—proven by years of successful field performance,—DIAMOND Roller Chains are preferred too by construction men who carry the responsibility of getting the work done on *time*. » Because of the reserve capacity, long-life efficiency and dependability of DIAMOND Chains, experienced contractors make sure that they are specified too for all replacements. DIAMOND CHAIN & MFG. CO., 418 Kentucky Avenue, Indianapolis, Indiana. Offices and Distributors in All Principal Cities.

Trade Mark

"Give me a CROSBY CLIP Every time"

It has proved its dependability on every big construction job in this country for the last fifty-eight years.

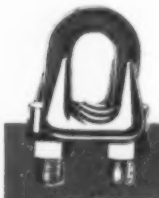
YOU CAN'T LAUGH OFF A FIFTY-EIGHT YEAR SAFETY RECORD. You get these Safety Features when you Standardize on the Genuine CROSBY CLIP:

1—Correct Gripping Design.
2—Drop Forged Steel Base.
3—Long Base for Greatest Grip.
4—Oversize Steel U-Bolt.
5—U-Bolt Threads Galvanized.
6—Large, Smooth-Running Nuts, Easily Applied.
7—Hot Galvanizing Resists Rust, Corrosion.

They're built to grip rope and hang on regardless.

They're the real grab-me-tights — and they're drop forged steel to match the steel cables.

Like the boss says, "Specify Genuine CROSBY CLIPS, give 'em to men who know how to use 'em — and your wire rope fastening troubles are over."



AMERICAN HOIST & DERRICK CO.
CHICAGO ST. PAUL, MINN. NEW YORK
AMERICAN TERRY DERRICK CO. SOUTH KEARNY, N. J.

(Continued from page 103)

ing a two-story office building, a maintenance shop and boiler house, all of which adjoin the 4,000-ft. long assembly building, and a paint shop, hangar and cafeteria buildings, which are separate structures.

By blanketing the interior walls of each structure with white Fiberglas, the engineers have not only provided for insulation and absorption of between 60 and 75 per cent of all factory and office noises, but have also obtained a light-reflecting surface that will maintain brightness at a high level. Each assembly building will have 17,000 two-tube 200-watt rectified (RF) fluorescent units recently developed by General Electric Co. for high bays, to provide at least 35 ft.-candles at the working plane in continuous service.

A white cement floor will enhance the general lighting efficiency by reflecting light up on the underside of parts and planes on the assembly lines.

Two Mezzanines

Each plant has been designed with two mezzanine levels alongside the assembly line, for storage of various parts and subassemblies convenient to the particular assembly station where they will be installed. These mezzanines are suspended from the 120-ft. trusses spanning a secondary aisle beside the 200-ft. assembly section, and are supported on one side by the center columns.

It was necessary to provide some passage for monorails from aisle to aisle at intervals along the assembly line, and this need has been met by limiting the length of mezzanines to 450 ft. so that there are seven 50-ft. transfer aisles available for monorail crane connections. This has resulted in the creation of eight separate mezzanines at each level, 30x450ft., and these are served by eight rotary lift hydraulic elevators large enough to handle all but the heaviest parts and bulkiest subassemblies as they are received by truck or rail from automotive factories, engine manufacturers or other plants participating in the bomber-building program.

With food wagons and first aid stations, tool cribs, washrooms and toilets all located directly below the mezzanines or on them, nothing will obstruct the free operation of the interconnecting monorail systems which will serve the entire area of each assembly building. They will be capable of carrying a fully assembled 4-engine bomber the entire length of the 4,000-ft. assembly aisle where 40-ft. clearance has been maintained, or transferring other overhead loads up to 20 tons between any two points in the 1,294,000-sq. ft. building area.

Bombers will progress through the final stages of assembly on parallel conveyors extending nearly 2,000 ft. through the assembly aisles, every portion of which will be served by a network of power lines in some 10 mi. of underfloor service duct.

Construction Quantities

More than 750,000 cu. yd. of earth had to be moved in grading at each plant, where more than 150,000 cu. yd. of concrete and 4,000 tons of reinforcing steel will be required. There will be 1,490,000 sq. ft. of concrete floors in each assembly building more than 150,000 sq. ft. in the aprons and another 175,000 sq. ft. of concrete paving in the roadways at each site.

Four and a half million face and common brick are being used in the curtain walls around the base of each plant, and it will take 50,000 gal. of grey paint to cover structural steel, exterior walls, doors and other painted surfaces with a single coat. Over and above the 27,000 tons of structural steel there will be approximately 4,460 tons of sheet steel in the side walls and roof, 1,000 tons in the doors, and about 750,000 sq. ft. of exposed steel in the side walls at each plant.

The Fiberglas products, including mats, board and wool, for roofs alone, will total more than 5,000,000 sq. ft. at each location, and an additional 2,300,000 sq. ft. of these same products will be used in the side walls. The combined weight of these glass materials averages only 1 lb. per sq. ft. of wall and roof surface.

* * *

Construction Trestle for *Mahoning Dam*

(Continued from page 49)

these gates can be raised to clear the spillway crest by 23 ft. Flood waters normally will be released through three gate-controlled sluices with their outlets near the base of the downstream face of the structure. An additional outlet controlled by a needle-valve is also available for low-water discharge regulation.

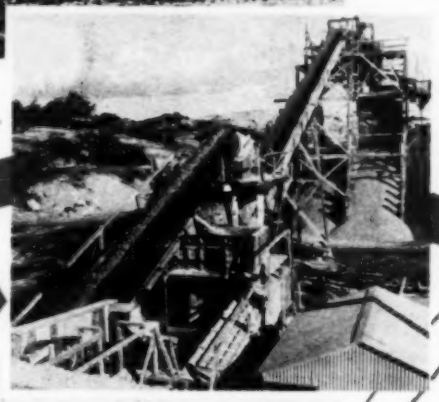
General Construction Plan

The general construction plan followed by the contractor involved the batching and mixing of concrete at a central plant alongside the damsite, delivery in 2-cu.yd. buckets by dinkey trains operating on track along downstream face of dam, and placement in the body of the structure by a pair of gantry-mounted Dravo Whirley cranes operating on a steel trestle extending the length of the structure. A feature of the trestle from which the placement of concrete was done was its support by pairs of concrete columns, 6 ft. in diameter, which were embedded in the body of the dam as the concrete rose in height. These columns were built in successive lifts with the aid of steel forms. The plan was always to maintain the construction trestle at a fairly low height above the level of the concrete being placed, so that the gantry cranes handled the buckets of concrete on short lines of cable. As the level of concrete rose in the main body of the structure the trestle also was raised by extend-

(Continued on page 106)

Modern Aggregate Plants ...by TELSMITH

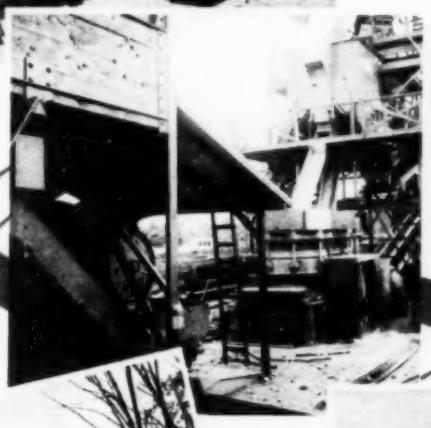
Pendleton Const. Corp.
Dublin, Va.



Crystal Concrete Products Co.
Braintree, Mass.

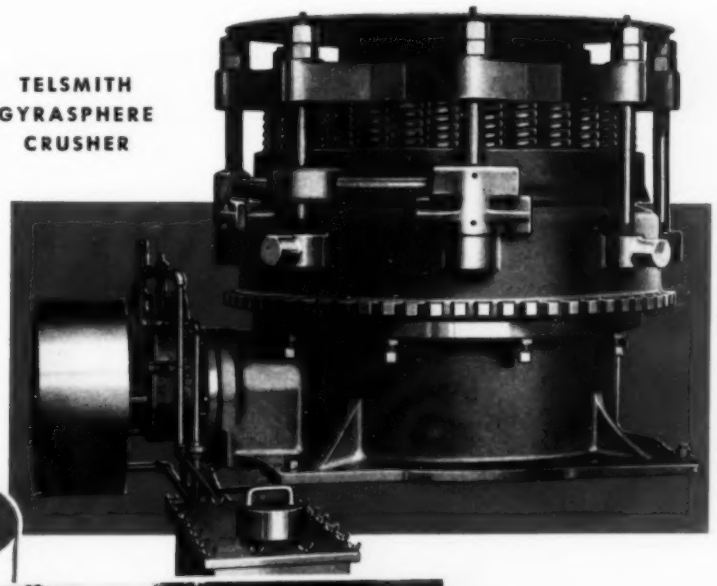
Like hundreds of Telsmith plants all over the world, these new rock crushing and gravel washing plants have operated smoothly, efficiently and profitably right from the start. Most of them are operating on defense work, where the production pressure is tremendous. A Telsmith plant means the latest in equipment—crushers to bin gates—Telsmith-designed-and-built for extra staying power, greater flexibility and capacity, lower operating and upkeep costs. And Telsmith *Balanced* Engineering Service and centralized responsibility fits that plant to your own particular needs. *Write for Bulletin EP-10.*

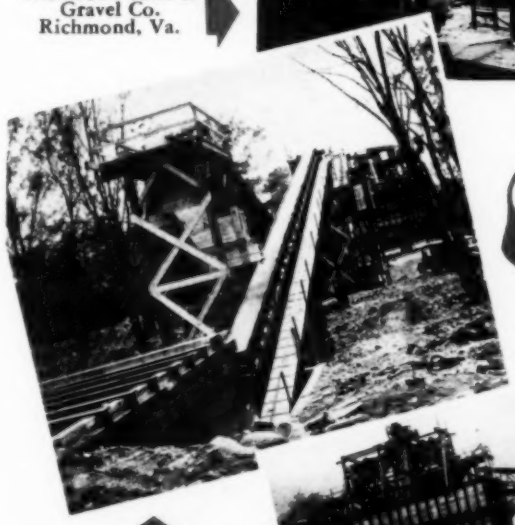
Callan Construction Co.
Wickford Junction, R. I.



Richmond Sand & Gravel Co.
Richmond, Va.

TELSMITH GYRASPHERE CRUSHER





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Boston Sand & Gravel Co.
East Greenwich, R. I.

Banks Stone & Sand Co.
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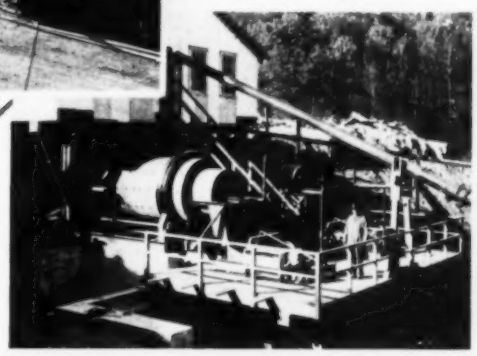

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Here's a truly money-making volume for contractors, engineers, and others concerned with heavy construction projects — giving you all the essentials of planning the camp, plant, and working schedules to attain the smoothest, most economical, and most productive operation. Largely with specific facts right from the authors' experience, the book shows the vital points to consider in planning the job plant and its operations, and includes many descriptions and data on construction machinery to aid in all the problems of selection and operation.

CONSTRUCTION PLANNING AND PLANT

By ADOLPH J. ACKERMAN
Director of Engineering, the Dravo Corporation, Pittsburgh, Pa.

and CHARLES H. LOCHER
Contractor

381 pages, 6 x 9, 156 illustrations, $4.00

THE treatment throughout is for practical construction men. The facts and examples are all from typical heavy construction experience. For the first time performance data is assembled for convenient reference on various sizes and types of equipment, including actual experience of production on jobs. So comprehensive and practical is this material that you will get many valuable tips on construction methods from it as well as aid in the selection of equipment.

Many Valuable Tables

The book is generously interspersed with tables which show camp facilities; shop and yard facilities; cost analysis in loading and hauling earth; specifications of large Diesel track-type tractors; standard rock crushers; car-unloading methods; variables which affect output of excavating equipment; etc., etc.

A few of the 250 major topics treated:

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- Coordinating Design and Selection of Plant
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- Construction Sequence on Cofferdams
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- Economics of Hauling Equipment
- Consolidation on Cementation Processes
- Compressed-air Regulations
- Drilling and Mucking

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City and State .....

Position .....

Company ..... C.M. 12-41

(Books sent on approval in U. S. and Canada only.)

(Continued from page 104)

ing its concrete column supports, from time to time, by pouring additional lifts with the aid of the circular steel forms.

Another feature of the design of the construction trestle was that the use of the massive concrete columns, 6 ft. each in diameter, eliminated the need for lateral bracing.

Concrete Placed From Trestle

From the trestle above described the bulk of the mass concrete required for the main body of the dam was placed. However, as the dam neared its ultimate height and narrowed in width, support of the construction trestle was transferred to steel bents seated along the downstream face of the dam, as shown in an accompanying illustration. Tracks to carry the dinkey trains for the delivery of concrete, located originally on a low-level line near the base of the dam, also were raised to the new high level provided by the construction trestle in its new position.

Forms for concreting the dam were of the cantilever type and were raised in successive lifts as work on individual blocks of the structure progressed. Concrete was vibrated immediately after being discharged from the 2-cu.yd. buckets. Before each new lift was poured, the surface of the concrete was cleaned and laitance removed by air and water jets.

Administration

Mahoning Dam was built under the direction of the U. S. Engineer Office, Pittsburgh District, with the following officers successively in charge of the project as district engineer: Lt. Col. W. E. R. Covell and Lt. Col. L. D. Worsham. J. I. Bowman served as resident engineer. For the Dravo Corp., general contractor, of Pittsburgh, D. P. Childress was superintendent.

* * *

Precast Concrete Joists

Cut Cost of Navy Warehouse

(Continued from page 71)

units. Then the side forms of the longitudinal girders are set in place in readiness for pouring of girder concrete.

The warehouse and mold-loft building was designed and constructed for the Bureau of Ships, U. S. Navy. The general contract was executed by the E. S. McKittrick Co. of Los Angeles, and the contract for manufacture and placement of the prefabricated units by the Wailes-Bageman Co., of Los Angeles.

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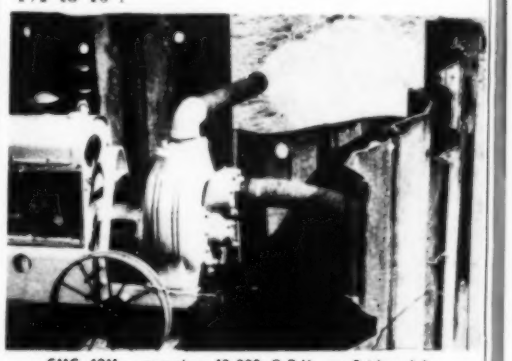

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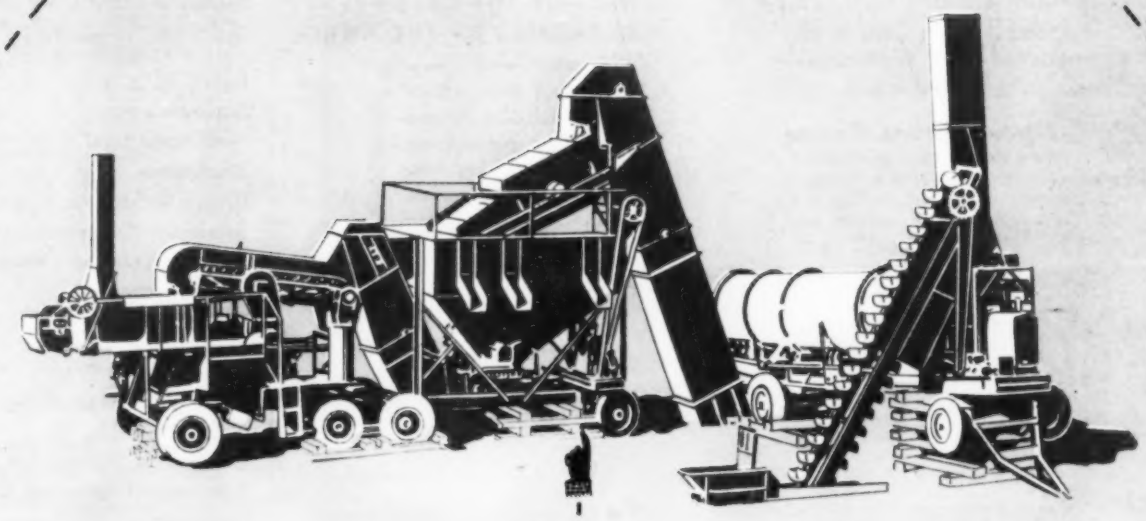

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WITH A BARBER-GREENE
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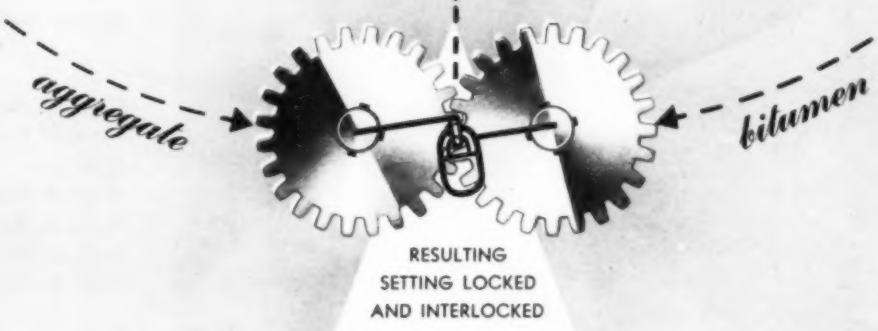

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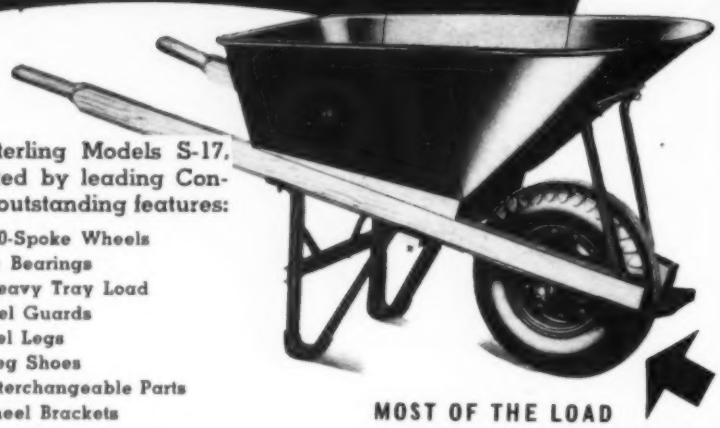

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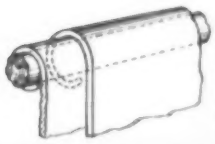

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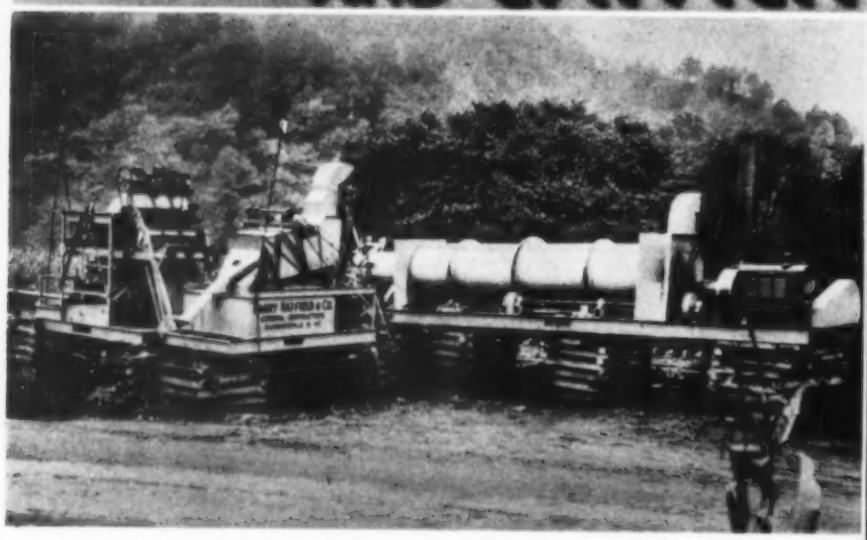

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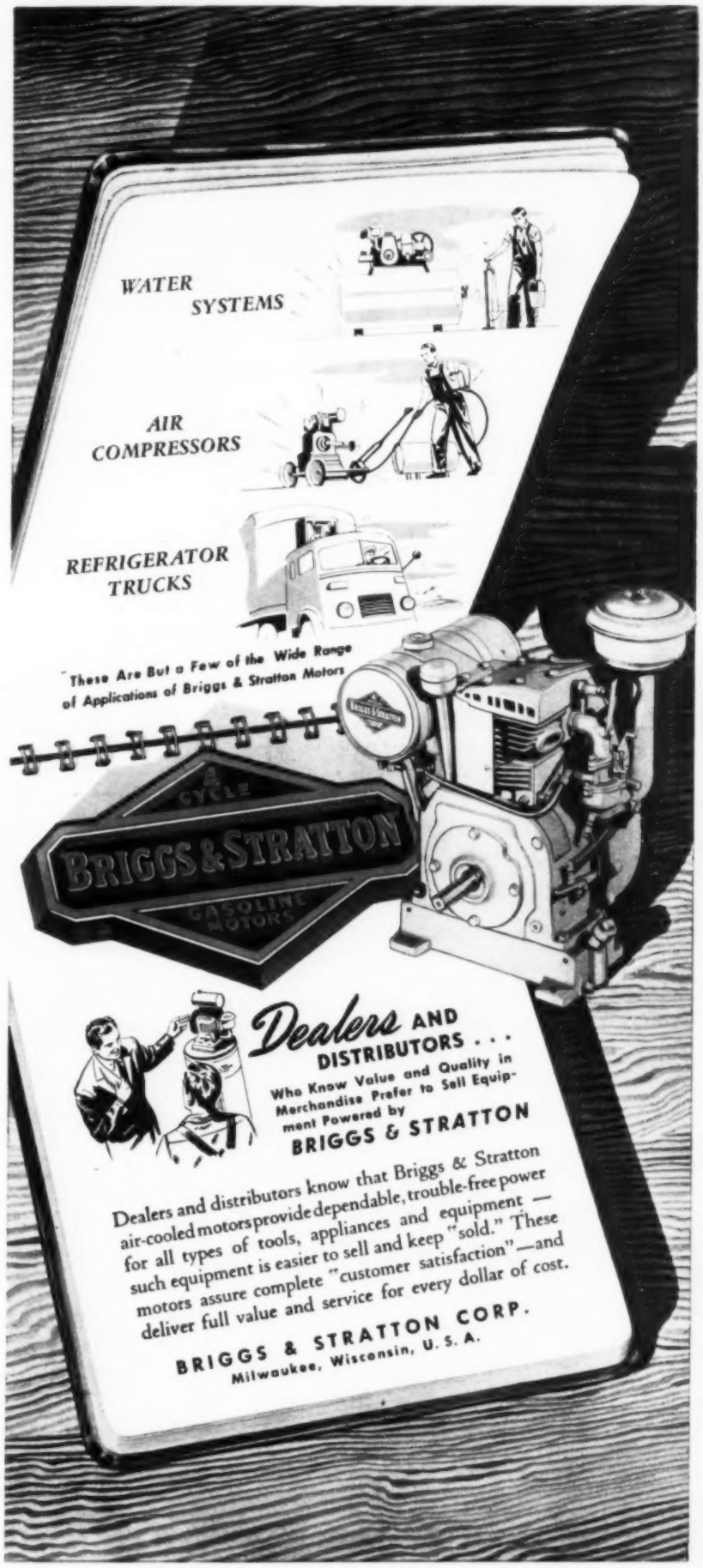

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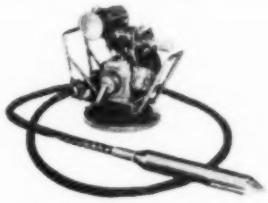

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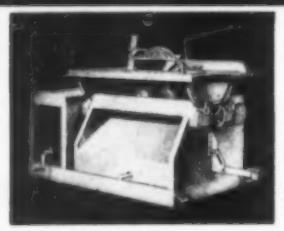

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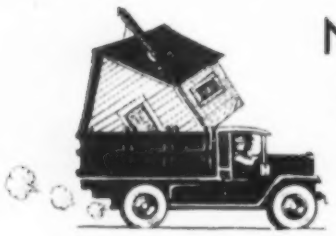

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